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PARTHENIUM HYSTEROPHOROUS.

By H. V. Arny, Ph.G., Ph.D.

The *Pharmaceutical Journal and Transactions*, in its issue of May 30, 1885, called the attention of the pharmaceutical world to this "common weed of Jamaica," quoting from *La Cronica Medico-Quirurgica*, of Havana, the physiological experiments of Dr. Jose R. Tovar with a so-called alkaloid, which he named parthenine, obtained from the plant. Another reference to the body parthenine is found in *Pharmaceutical Journal*, June 26, 1886, where the investigations of M. Guyet, as reported to the *Société de Thérapeutique* of Paris, are set forth. The next reference to the plant is found in *Merck's Bulletin*, October, 1888, where an alkaloid, discovered in the plant by Dr. Carlos Ulrici, and called parthenicine, is described.

At this point the writer undertook an investigation of the plant as a graduation thesis, and as reported in Am. Jour. Pharm. (1890, p. 121) no evidences of an alkaloid were found. The alcoholic extract, however, yielded a body which was supposed to be a glucoside.

Believing that the plant, one of the most common weeds of Louisiana, may have a future, and realizing that its active principle might prove interesting chemically, investigations were resumed with general results herein stated.

BOTANICAL CHARACTERISTICS.

Parthenium hysterophorous is a composite plant, sub-order Tubulifera, with radiate heads, pistillate rays and sterile disc florets. It is a pubescent annual, having diffuse stem, pinnatifid leaves, with linear toothed lobes and prominent nervature (*Frontispiece*).

Its heads are loosely panicled with involucre of five ovate scales, arranged in two rows, (*Fig. 1*). There are in each head five ray florets in a single row, each resting within an oval chaffy scale which is hairy above, and which, on separating, usually divide in three portions. The ray florets are short, pistillate, ripening to smooth, compressed achenia, with pappus composed of oval scales (*Fig. 2*).

The disc florets are tubular, five-toothed and sterile, having syngenesious anthers producing pollen grains, which are prickled similarly to those of malva. Those nearest the ray florets are attached in pairs to each of the chaffy scales mentioned above (*Fig. 3*). Each

Fig. 1. Parthenium Hysterophorous. Outer involucre, magnified twenty diameters.

inner floret has its own chaffy scale, which is more narrow than those on the outer rim. The receptacle is conical and not very prominent.

The plant commonly called Bastard Feverfew grows in the West Indies (where it is known as Escoba amargo), in Florida and in Louisiana. It has been introduced in Europe as *Absinthe sauvage des Antilles*. It attains the height of three feet, possesses a peculiar heavy odor, while the leaves and flowers have an intensely bitter taste.

The anatomy of the active part of Parthenium hysterophorous is simple. The chaff is composed of longitudinally elongated cells in

single layers, through which pass branching fibro-vascular bundles, the prominent constituent of which are spiral ducts. The scales terminate in a mass of hairs composed of two to four cells, of which the terminal one is the largest. The cells of the corolla of the disc florets are more symmetrical than those of the chaff, the vascular system is identified by the spiral ducts. The walls of the

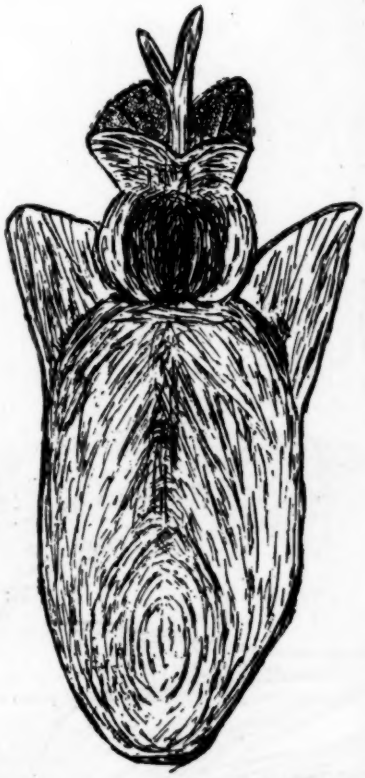


Fig. 2. Ray floret, magnified about forty-eight diameters.

anther cells possess reticulate markings which are quite characteristic. The pollen grains, as mentioned above, are prickled (*Fig. 4*). A cross-section of a leaf lobe shows the prominence of even the secondary veins. These project chiefly on the under side. The closed fibro-vascular bundle is bi-collateral. The lower half of the leaf is of spongy parenchyma, while the upper consists of a palisade layer (*Fig. 5*). The epidermis of the under side is interrupted by

stomata and beset with several-celled tapering hairs (*Fig. 6*). The important characteristics of the powder are the prickled pollen

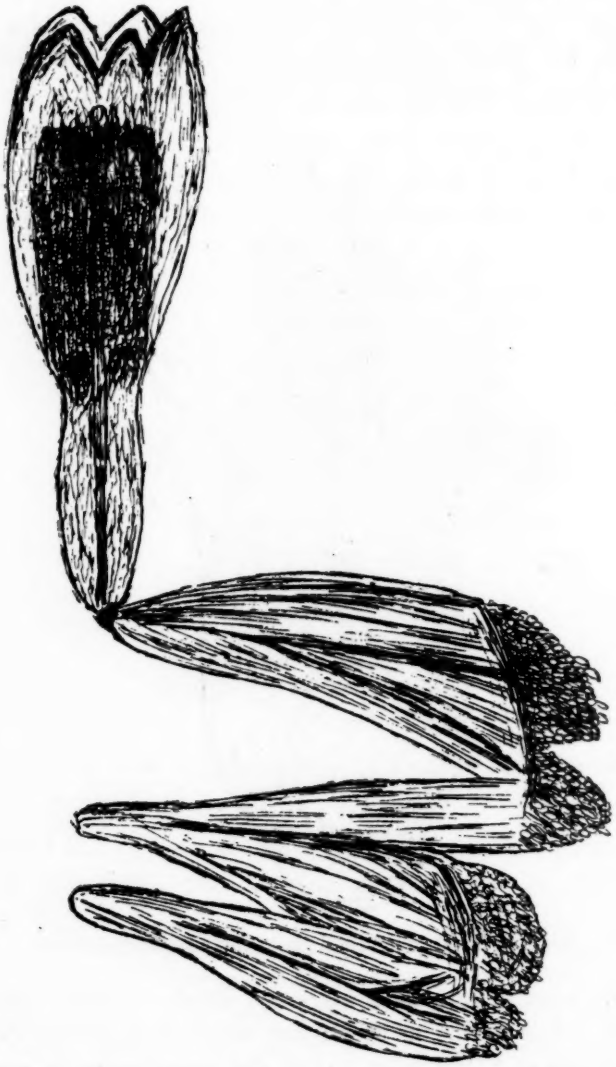


Fig. 3. Outer disc floret, attached to chaff, magnified about forty-eight diameters.

grains, the hairs and longitudinally striate tissue of the chaff, the tapering hairs of the leaves, the reticulated anther walls and numerous spiral cells of various sizes (*Fig. 7*).

CHEMICAL COMPOSITION.

The writer's analysis of the plant in 1889 showed, beside such normal plant constituents as starch, wax, gum and mineral salts, the presence of an active principle to which the bitterness of the plant is due. It was obtained from the alcoholic extract of the drug by

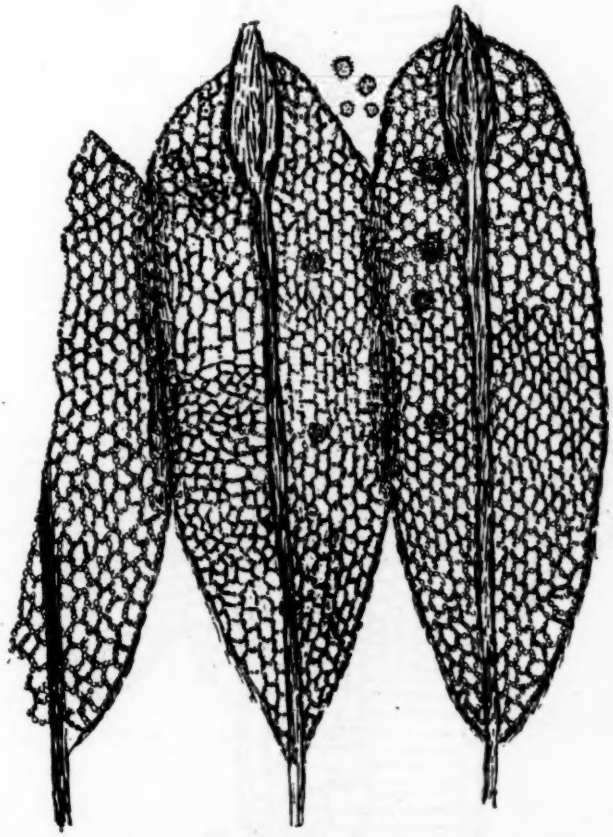


Fig. 4. United anthers, magnified about 150 diameters.

evaporation to dryness, solution in water and extraction by agitation of the aqueous liquid with chloroform, and is supposed to correspond to the parthenine of Tovar, as well as to Ulrici's parthenicine, all the products being in a more or less impure form. Tovar's original article has not yet been procured, despite efforts in that direction, and the reference in the *Pharmaceutical Journal* gives no inkling

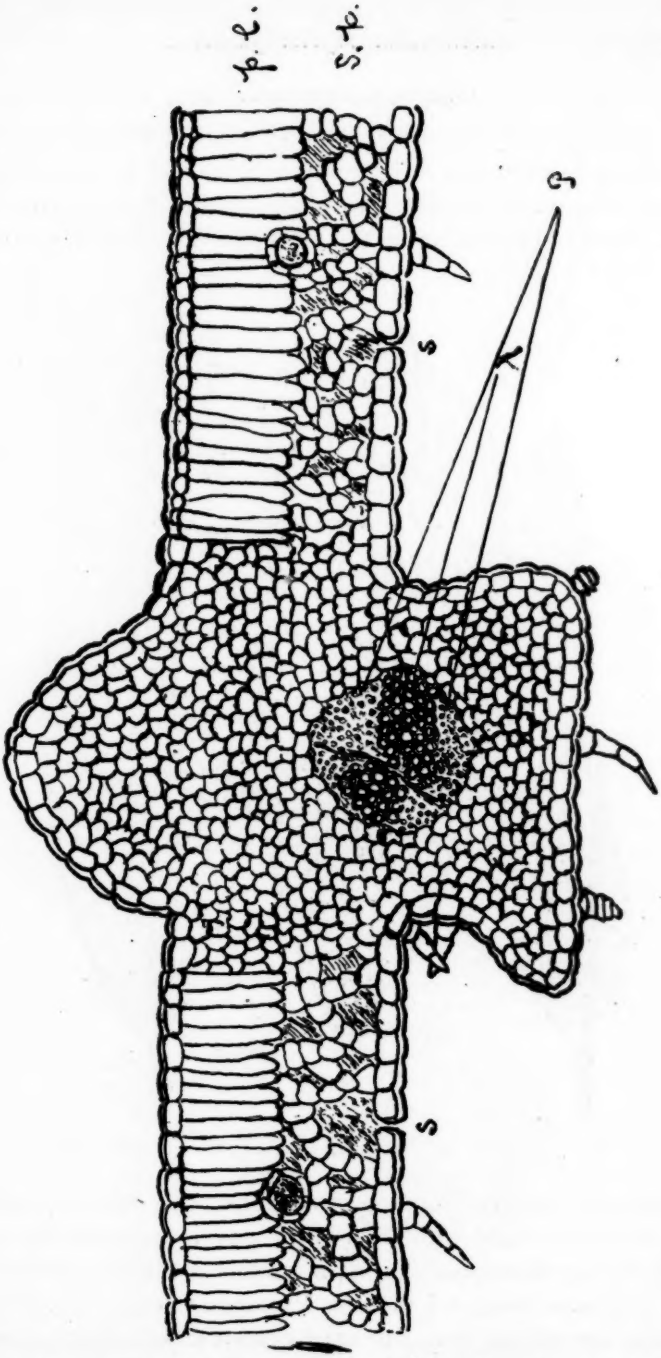


Fig. 5. Cross section of leaf, magnified about 600 diameters. *p. l.*, palisade layer; *s. p.*, spongy parenchyma; *s*, stomata; *x*, xylem; *p*, phloem.

of the mode of preparation. Guyet's paper, as reported in full in *La Cronica Medico-Quirurgica*, of Havana, is a *résumé* of the chemical researches of Ulrici, with an account of the therapeutical properties of the drug, as deduced by the author of the article. Ulrici obtained from the plant black shining scales, from an alcoholic solution of which he separated, by means not stated, a white amorphous residue which crystallized in fine needles.

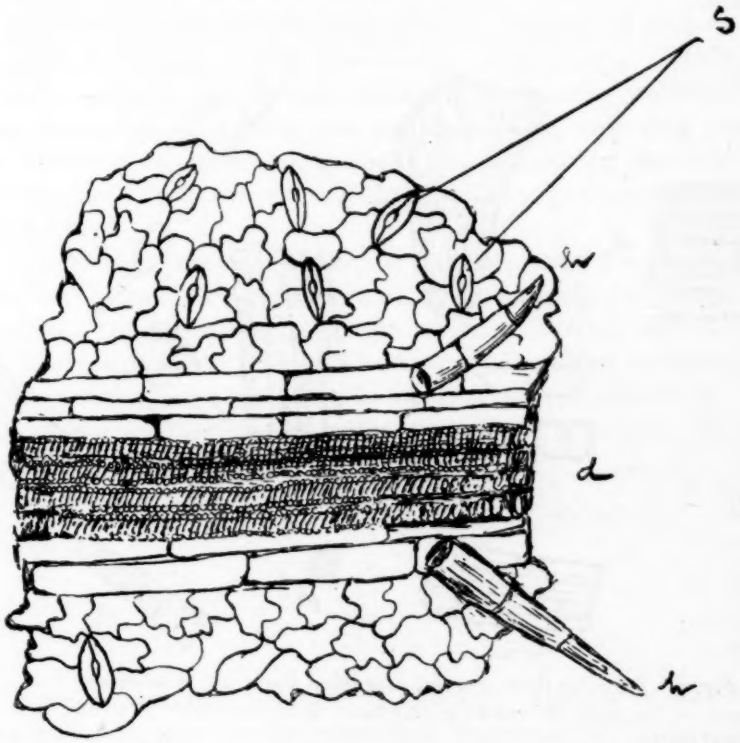


Fig. 6. Under surface of leaf, magnified about 600 diameters. *s*, stomata; *h*, hairs; *d*, spiral ducts.

He then dissolved another portion of the black scales in water, cleared of coloring matter by slight excess of potassa and extracted, with chloroform, a substance to which he assigned the formula $C_{19}H_{28}NO_6$.

Merck's Bulletin, October, 1888, describes, without method of manufacture, the alkaloid parthenicine of Ulrici, without reference to the original article. As this statement is two years older than

the researches of Ulrici published in Guyet's paper, it is presumed that the substance is a purified form of that to which was assigned the formula $C_{19}H_{28}NO_6$. It is described as follows: "Large rectangular prisms, with pyramids on four lateral sides. It is odorless, very bitter, quite readily soluble in water—still more so, however, in hot water—in alcohol, ether and chloroform. It gives colored identity-reactions with sulphuric acid and with potassium bichromate."

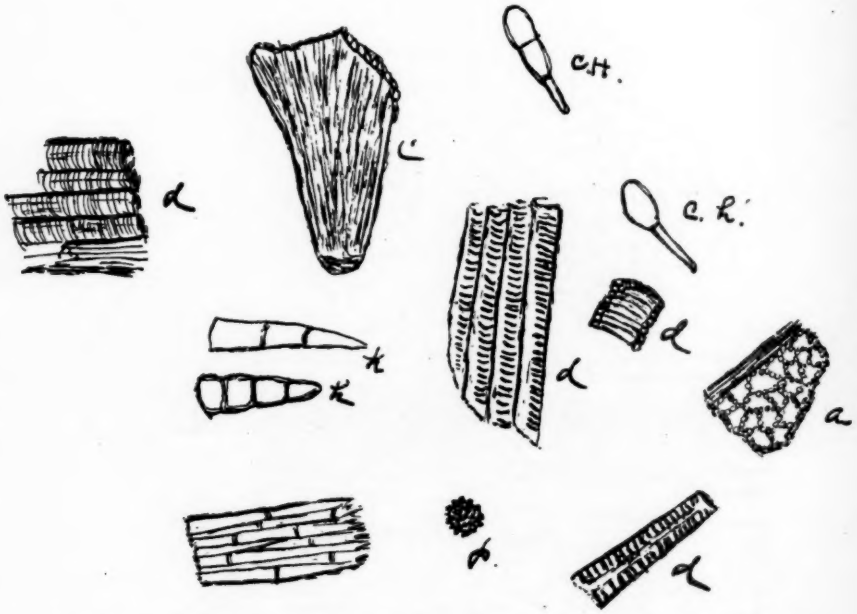


Fig. 7. Particles from powder, magnified about 200 diameters. *c. h.*, chaff hairs; *c*, fragment of chaff; *a*, fragment of anther wall; *p*, pollen grain; *d*, spiral ducts.

Such is the scanty knowledge of Tovar's parthenine and Ulrici's parthenicine. In neither case is that very important means of identity—the melting point—nor the color of stated reactions given.

So the means of identification of the active principle isolated by the writer with the so-called parthenine and parthenicine are almost missing.

On resuming the study of the plant, the first efforts were in estimating the loss of water in desiccation.

The following figures were obtained:

Month of Collection.	Weight in Grammes. Fresh.	Weight in Grammes. Dried.	Percentage of Loss.
April	134·66	30·3	77·49
May	737·	150·5	79·5
June	552·8	127·6	76·91
July	885·9	177·2	79·99
August	680·4	106·3	84·37
September	538·65	155·9	71·50

In each case the sample was dried by hanging in a room accessible to draughts of air for six to eight weeks. While, of course, owing to the complex structure of the drug and the varying proportion of cellular and ligneous tissue, such data cannot be exact, it is, nevertheless, useful in establishing the fact that the amount of water in the fresh herb is somewhere between 70 and 80 per cent.

The average percentage of active principle was the next problem, and its extraction was performed by exhausting the drug with diluted alcohol; distilling off the alcohol; filtering the aqueous residue; washing the filter with water until the filtrate was tasteless, and extracting the aqueous liquid by agitation with chloroform. In this way a slightly impure yellow amorphous mass was obtained, and the yield was as follows:

								Per Cent.
25	grammes	air-dried	drug,	collected	in	April,	yielded	0·31
100	"	"	"	"	"	May,	"	0·84
100	"	"	"	"	"	June,	"	1·03
100	"	"	"	"	"	July,	"	1·13
75	"	"	"	"	"	August,	"	0·66
100	"	"	"	"	"	September,	"	0·53

It will be seen that the quantity of active principle in the plant gradually increases to the maximum in July, when it diminishes with the length of days until in October the plant is almost free from bitterness.

The process of extraction described above was not satisfactory, as the product was invariably contaminated with coloring matter; so other methods were tried. That used in the preparation of salicin—treatment of a decoction with lead oxide, removal of excess with sulphuric acid and neutralization of free acid with barium sulphide—did not prove satisfactory, as the lead oxide failed to remove all the coloring matter.

The process followed with best results was treating an infusion with lead acetate, filtering and agitating the filtrate with chloroform, distillation of the chloroformic extract, thereby recovering the solvent. The residue, by crystallization once or twice from alcohol, to which a small quantity of water had been added, was obtained pure in well-formed crystals—some 5 centimeters long—melting at 168°–169° C. The yield of pure substance from drug collected in June and July was about 1 per cent.

It proved soluble in 160 parts water, at 20° C.; 5 parts 95 per cent. alcohol; 2½ parts boiling alcohol; 110 parts ether, and in chloroform and acetic ether. It was soluble both in solution of soda and in ammonia water, the former solution turning red-brown on standing, the latter remaining colorless. It dissolved in concentrated sulphuric acid without change of color, but the solution became green on the addition of a crystal of potassium bichromate.

The aqueous solution was neutral to litmus paper.

That it is not an alkaloid was shown by the non-appearance of a precipitate on addition of Mayer's reagent to its aqueous solution, as well as by its solubility in solution of soda.

It failed to respond to tests for nitrogen, namely, heating with soda-lime and also heating with metallic potassium, and attempted conversion of the fused mass into Prussian blue by treatment with alkali, ferrous sulphate, ferric chloride and hydrochloric acid; while Schönn's test for sulphur gave negative results.

The substance has been analyzed and the empirical formula deduced therefrom, but this will not be stated until confirmed by an estimation of molecular weight and by analysis of derivatives.

The substance not being an alkaloid, the name parthenin can be safely bestowed upon it.

The rather superficial examination made by the writer in 1889 suggested the glucosidal character of parthenin. Careful investigation does not, however, confirm this surmise. As a glucoside, parthenin should, under the action of a diluted acid, be converted into glucose and some other body. This, as experiment showed, does not occur, although the reaction was attempted in two different ways. In the first method, several portions of parthenin were heated with diluted sulphuric acid for periods varying from boiling for one minute to heating on water-bath for four hours. The liquid in each case, after

its special method of heating, was agitated with successive portions of ether until the last ethereal portion possessed no bitter taste. The aqueous liquid after such extraction was carefully examined for glucose. Trommer's, Böttger's and the picric acid test were applied in each case with negative result.

The ethereal extract on evaporation yielded a brown syrupy mass. Crystallization from alcohol and acetic ether was attempted without success. By treatment with a small quantity of water, the substance solidified to an amorphous mass, which was still yellow from contamination with a resinous substance that reddened with solution of soda. This body melted at about 170° C. and is supposed to be the original substance. Other portions of the residue, after careful washing with ether, melted at 170°.

The second method was in boiling an alcoholic solution of parthenin with a small quantity of diluted sulphuric acid, addition of water, evaporation of the alcohol and extraction with ether. The aqueous residue gave no indication of glucose.

Since not a glucoside, parthenin was expected to possess reactions similar to some of the proximate principles. Its solubility in solution of soda suggested an analogy to santonin, and in that case a sodium compound, similar to sodium santoninate, might be produced.

To this end, parthenin was treated with a diluted solution of soda, carbon dioxide passed in until saturated and the solution evaporated to dryness, the passage of carbon dioxide being continued to the end of the heating. The perfectly dry residue was treated with absolute alcohol, when the filtered alcoholic extract yielded on spontaneous evaporation a yellow syrup, which, on addition of a small quantity of water, solidified to a brownish yellow mass, which gave the sodium flame and charred on heating, melting irregularly but not completely, until at red heat. This was sparingly soluble in water, and the aqueous solution, which was neutral, yielded a precipitate with silver nitrate.

An effort to obtain the product after the method used in the manufacture of sodium santoninate, dissolving in solution of soda and crystallizing the resulting product by concentration of the solution, has not yet met with success.

This somewhat superficial effort seems to indicate rather clearly the formation of a sodium compound of parthenin, which can be converted into a silver salt. The investigation of this sodium compound is still continued.

The fact being clearly established that parthenin is not a glucoside, but rather a proximate principle somewhat akin to santonin, suggests a more practical method of preparation than by extraction with chloroform. A process in which the lead acetate dissolved in the cleared decoction was dissociated by addition of sulphuric acid, which would precipitate the lead as sulphate, was not attempted lest the acetic acid set free would react with the parthenin. This fear is groundless, and a practical process of extraction on these lines will be devised.

On distillation of the drug with steam there passed over a minute quantity of volatile oil possessing the distinctive odor of the plant, and from which, on standing, there separated a stearopten possessing camphoraceous taste. As yet the quantities won have been too small for investigation, but attention will be turned to it during the coming summer.

In conclusion, a few words as to the medical properties of parthenin. Tovar reported it as a remedy in facial neuralgia, and it also proved beneficial in a case of fever and anæmia where quinine failed. Guyet confirmed its efficiency in neuralgia, especially the cranial variety; but he found it utterly without effect as antipyretic. In Jamaica the plant is used as a remedy for ulcerated sores and certain skin diseases, especially such as are of a herpetic or pustular character. The dose of Ulrici's parthenicine is stated as 0·05 gramme every hour in neuralgia, while gramme doses are used in intermittent fever.

The subject is worthy of further consideration on the part of therapeutists, and to this end the writer proposes preparing during the summer considerable parthenin, which will be furnished in limited quantities to those physicians who will agree to conscientiously test its merits and publish the results, whatever they may be.

The writer's thanks are due Miss S. E. Bres for the artistic sketch of the flowering branch.

New Orleans, March 8, 1897.

Formaldehyde is detected by dissolving 0·1 gramme of morphine hydrochloride in 1 c.c. of concentrated sulphuric acid, and adding an equal volume of the solution to be tested, without mixing; in the presence of formaldehyde the aqueous solution will become a clear red-violet color in a few minutes.

THE SHADDOCK OR GRAPE FRUIT.

By J. H. Hart,
Superintendent of Botanical Department, Trinidad.

The March, 1896, number of the American Journal of Pharmacy is especially interesting to me, and as I am a twenty-one-years resident (constantly employed in botanical matters in the West Indies), I venture to make a few remarks on it. As a rule we look at pictures before the reading matter, and I did so in the case of the shaddock paper. Now, as I know the plant, the illustration No. 1 is certainly not a shaddock, but a grape fruit, or forbidden fruit, and as I find, page 123, paragraph 4, that the terms grape fruit and shaddock are interchangeable, this may explain.

It is quite true that "*no reliance can be placed upon the common names of plants or flowers, etc., etc.,*" and this sentence contains the gist of the whole controversy as to names.

I know Jamaica well, having resided there eleven years, and know the districts of Macfadyen well, and the fruits in them.

The home (English) botanist, however, makes the citron, lemon and lime one species. Macfadyen made them three; and various other changes, etc. The true fact is, no two men can see alike. If asked to classify the citrus tribe, I should make *Citrus medica* include all the lemons and limes and their hybrids, which are legion.

I should let *Citrus aurantium* represent the orange of the St. Michael's type (sweet orange), with all its varieties, and I would let *Citrus decumana* cover all the shaddocks, grape fruit, or pumelows, etc., and their varieties, which are also very numerous. *Citrus nobilis*, or the tangerine and mandarin (also interchangeable names), appear to maintain themselves fairly distinct. These oranges are sometimes called "Portugal oranges" in Trinidad. We have one, however, imported from Grenada, W. I., that approaches the grape fruit in size; at the same time, I recognize intermediate varieties between many of those mentioned.

We have a sweet lime, a fruit with an orange skin, with a lime flesh, but with a distinct mixture of orange and lime in flavor. We have a lime, larger than a lemon, with none of the characters of a lemon. There is a sweet orange called the bergamot in Jamaica, which is very clear and distinct from that I recently received from Italy as bergamot; and unless we agree to adopt *special Horticul-*

tural names, I do not really see how the botanists can help out of the muddle, for muddle indeed is the classification of citrus. I had lately one of the finest shaddocks sent me I ever saw; it was delicious in flavor and of a bright red. I have grafted plants on lemon and orange stocks, and have two fine unions growing freely.

In Jamaica, shaddock is shaddock and nothing else; although an old "nigger," to please a questioner, if asked: Is that shaddock? pointing to a grape fruit, would say: yes, massa! Shaddock, sa'! or *vice versa*. Shaddock, however, in the market, is shaddock, or the largest fruit of the citrus tribe. Grape fruit, or forbidden fruit, presents as many characters as other varieties of citrus. Red flesh, white flesh; sour, bitter, sweet; but the one called grape fruit hangs in clusters like grapes (6 to 10 together), hence the name; and there is evidence that the larger kind comes from the smaller.—"The Shaddock from the Grape Fruit" (see Bulletin No. 9 of this department, p. 19).

I must take exception to the statement, p. 126, "which are extremely acid." The author should have stated that Jamaica oranges were extremely acid. Trinidad oranges and Grenada oranges are extremely sweet; but while you can get good oranges in Jamaica, there are truly many sour ones there. In both Jamaica and Trinidad, the wisdom of planting seedlings is being almost universally doubted, and my article 225, Bulletin, was especially directed to this point.

TRINIDAD, January 26, 1897.

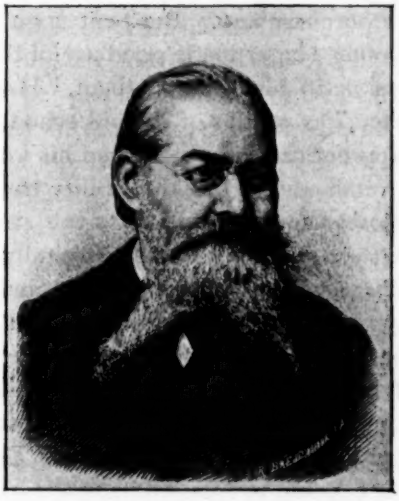
HERMANN HAGER.

BY FRED. HOFFMANN.

On the gloomy afternoon of the 29th of January, 1897, a small company, consisting of a few relatives, of some townspeople, including several local pharmacists, and of the representatives of two pharmaceutical papers, followed a plain hearse to the graveyard of the town of Neu Ruppin, located a few miles northwest of the German capital. Such was the funeral of the Nestor of German pharmacy of our generation, *Dr. Hermann Hager*. Flowers and palms sent as a last tribute of gratitude and respect by his publishers, and by the editors of the *Pharmaceutische Zeitung*, and of the *Pharmaceutische Wochenschrift*, in Berlin, covered the coffin and the grave,

and a wreath of flowers had been sent by the President of the German Apothecaries' Association. Although less than two hours by rail from the German capital, not one representative pharmacist, no delegate from any of the national or metropolitan pharmaceutical societies, nor from the journal founded by Dr. Hager in 1859, and graced by his famous name ever since, attended his funeral.

What a representative gathering would the funeral of such a man of national, nay, of world-wide reputation, have drawn together anywhere in the United States! The foremost representative men of American pharmacy hastened to Philadelphia to pay a last respect to *Procter* at his funeral in February, 1874, and to *Maisch* in Sep-



tember, 1893. No such tender sense of gratitude and veneration seems to pulsate in the hearts and among the ranks of the representative men and members of pharmaceutical associations on this side of the Atlantic. A profession as well as a country honor themselves by honoring the life work and the memory of their great men during their lifetime as well as at their demise, even if the saying should apply: "a man lives by his excellencies and not by his faults." It is the more gratifying that the Continental pharmaceutical press has promptly and nobly offset this apparent show of a want of veneration for the departed master of German pharmacy by unanimous and warm-hearted obituaries.

Hans Hermann Julius Hager was born in Berlin on January 3, 1816, where his father was an army surgeon. After having passed the elementary schools, he attended the high schools at Torgan and Brandenburg, and in April, 1832, entered upon an apprenticeship in the pharmacy of the town of Salzwedel. Then apprenticeship in German pharmacies included the performance of all the common handiwork, of keeping the store, the laboratory and the storage rooms in proper order, of cleansing and dusting counters, shelves, containers, utensils, oil-lamps, etc., of delivering medicines to customers, etc. Young Hager was by no means spared this hard ordeal. Little leisure time was left for study, and but very few pharmaceutical books were placed at his disposal, while his means were insufficient to purchase any. But bent upon study, and of an inquisitive mind, young Hager made good use of the few text-books of pharmacy accessible to him, among them, "Hagen's Treatise on the Art of Pharmacy," as well as of his old school-books. During the four years of apprenticeship he perfected his knowledge of Latin so much that he retained for life the ability to write fluently in Latin. He also closely applied himself to the study of French, of history and of natural philosophy. Incidentally he obtained a small treatise on chemical stoichiometry, which induced him during the last year of apprenticeship to elaborate a text-book of stoichiometry for pharmacists, which, however, never has been published.

At the close of his apprenticeship Hager passed the obligatory examination with much credit, and subsequently served as assistant for some years in pharmacies in several towns. During these years he read all books accessible to him, and applied himself with much interest and assiduity to becoming familiar with the flora of the diluvial plains of Northern Germany. He then served for one year as army pharmacist in the garrison hospital in the capital of Silesia, Breslau, whither his father had been removed as army surgeon. Here young Hager found time and opportunity to attend lectures at the University on natural philosophy, chemistry and botany. After having passed his one year of army service, he had the good fortune to obtain a place as assistant with an apothecary in the town of Perleberg, who was an accomplished pharmacist, a sympathetic man and the possessor of a good pharmaceutical library. Of this Hager made good use, so much so that in 1841 he ventured to apply to the highest examination board in medicine and pharmacy

in Prussia for permission to pass his State examination as apothecary without the customary preceding attendance of at least one year of university lectures. He was admitted and passed this ordeal with credit.

Hager subsequently served two more years as assistant, always applying his leisure time to study in almost every branch of natural science. He also succeeded in obtaining the degree of Doctor of Philosophy at the University of Jena, and, in 1843, he managed to purchase a pharmacy in the town of Fraustadt in the Prussian province of Posen. Here he attended to his comparatively small business most of the time with but one apprentice, married, raised a family and passed seventeen of the most studious and well-applied, and, perhaps, also happiest years of his life.

Besides a good prescription business, Dr. Hager attended, with his apprentices, to the preparation of all galenicals and most pharmaceutical chemicals, including all metallic salts and solutions, even to the preparation of the few alkaloids then in use. With his sense of practical application and great skill he attained to perfect mastership in the art and practice of pharmacy in every direction, as also in the performance of analytical and microscopical work and examinations, and accumulated a vast amount of knowledge and experience in all branches of the theory and practice of pharmacy and of related application.

While, during the years of assistanceship, Dr. Hager had occasionally contributed miscellaneous writings and some poetical efforts to local papers, he seems to have abstained from any contribution from the wealth of his knowledge and experience to pharmaceutical periodicals during the years of his activity as apothecary in Fraustadt. But there he soon entered upon his successful career as a writer and author. His first publications of repute seem to have been an essay on "Weather and Its Considerations," in 1845; his "Handbook of the Art of Dispensing," "Cosmos Diluvialis," or the deluge, an historical study; "Treatise on the Manufacture of Mineral Waters;" "Commentary on the Pharmacopœias of Northern Germany" (1854); "Manuale Pharmaceuticum;" "Adjumenta Varia;" "Pharmacopœia Homœopatica."

The success of several of these works, and the want of incitement as well as of literary and scientific resources in the small town, induced Dr. Hager the more to dispose of his pharmacy, as he, in

1859, had commenced the publication of a strictly scientific periodical, the *Pharmaceutische Centralhalle.* Early in 1860 he removed to Berlin, with a view to applying his entire time and labors to scientific and literary work. Henceforth his little private laboratory became the prolific starting point for the solution of many a scientific or technical problem in the practice of pharmacy, and of a vast amount of analytical and microscopical work. In 1864 Dr. Hager established, with his friend, Dr. E. Jacobsen, of Berlin, the *Industrie Blatter,* in which he inaugurated a fearless exposure of the nostrum fraud. Of these specialties he analyzed in the course of years more than any contemporary. He provided his two journals largely with material from his own pen and laboratory work.

In Berlin Dr. Hager contracted the friendship of the brothers, Ferdinand and Fritz Springer, of the eminent publishing firm of Julius Springer, who henceforth became his publishers and life-long friends. Here he elaborated and published "First Lessons in the Practice of Pharmacy," "First Lessons in Pharmaceutical Botany," "The Microscope," "Commentary on the Prussian Pharmacopœia," "Latin-German Vocabulary to the Pharmacopœia," and revised some of his former books for republication in new editions. In Berlin he also commenced the elaboration of his greatest and most enduring work, the "Handbook of the Practice of Pharmacy."

Dr. Hager's increasing reputation drew more and more callers to his quiet home and study in the German capital. Being of a retiring disposition, and carefully estimating the value of time, he gradually longed for a refuge where he could attend to and accomplish his life work in less disturbed solitude. He acquired a modest farmer's home, located in a rather isolated and unattractive place, called Pulvermühle, near the village of Fürstenberg, a few miles distant from the old university city of Frankfort, on the Oder River. He removed thither in October, 1871. Here Dr. Hager enjoyed, for ten years in full retirement, a studious and active life, applying all his time and interests to research and literary work. During these busy years he continued his analytical work, edited his two journals, one in Berlin, the other in Dresden, translated the first Pharmacopœia of the newly consolidated German Empire, and in 1872 and 1873 wrote a comprehensive commentary on this work.

In 1876 he completed and published his "Handbook of the Practice of Pharmacy," in two large volumes, to which he added a third

volume in 1880. This master work fully represented the accumulated knowledge of the past, largely enriched by his own vast stock of theoretical knowledge and practical experience in all branches of pharmacy, and of analytical and microscopical application, and of the examination and estimation of drugs, chemicals and of foods. It at once superseded all similar older works and became the standard text and guide book, as well as an almost never-failing reference work for pharmacists and druggists far beyond the limits of the Fatherland. It made the name of Hager a household word in pharmacy and the drug trade all over the world, and, at least abroad, is still a widely used pharmaceutical reference book.

During the remaining years of his residence in Pulvermühle, Dr. Hager accomplished a great deal of analytical work for revision and verification, elaborated a study on oil of turpentine and its detection as an adulterant of essential oils, and revised a number of his works for republication in new editions. In 1881 Dr. Hager removed, after the death of his only friend in his lonely retirement, a physician, to Frankfort-on-the-Oder, where he lived in strict retirement until 1896. Here he continued his customary laboratory and literary work, completed several revisions of his larger books and furnished various periodicals with occasional contributions. From the editorship of the *Centralhalle* and the *Industrie Blätter* he had retired in 1879, allowing his name to be retained on the title-pages.

Until 1890 Dr. Hager enjoyed excellent health and the full powers of his inquisitive and prolific mind and activity, always occupying himself with literary work or study, and in later years collecting minerals and conchyts; but in this year he became a victim to influenza, and since then his health failed in consequence of occasional relapses of this malady. In anticipation of the approach of the end of his struggles, the octogenarian resorted, with the most sympathetic and affectionate companion of his life, his wife, in July, 1896, to the home of one of their sons, living in the town of Neu Ruppin, near Berlin. Here he spent the last few months of his earthly life in peaceful meditation, kindly remembered by a few noble friends. In December, Dr. Hager suffered a severe relapse of influenza from which he did not recover. On the 24th of January he quietly fell asleep to eternal rest, from an active and most useful life, replete with superior work and generous efforts for his fellow-men, but devoid of public recognition and honors at home. His devoted

wife, who also suffered from influenza, on being informed, on the day of her husband's funeral, of his death, closed her eyes forever on the very same day.

More than any other of his German contemporaries, *Dr. Hager* was, in the American sense, a self-made man. The stamp of the autodidact remained impressed upon his character, his labors and his writings and imparted to them the charm and the force of originality. He was a man of rare talents, with a keen and discriminating intellect and an excellent memory. The style of his writings was lucid and attractive; he also was a clever draughtsman, drawing with his own pen nearly all the sketches for the abundant illustrations of his works. Intense work was to him always a labor of love. Like most men of originality and genius, Dr. Hager was also bent upon critical reflection and upon an unreserved candid expression of his opinion. However stern and straightforward his intellectual powers and the courage of his honest conviction made him, his mind was as gentle and forbearing as that of a child. In his long and active career, by no means free from cares and disappointments, and in a profession replete with antagonistic and uncharitable elements, Dr. Hager has not been spared the cruel stings and even the calumnies of adversaries, particularly of those more fortunate in inheritance and patronage, and more successful in public position and honors, which favors he never sought by submission or flattery. Although a recognized master of his profession, a prolific and excellent writer, and expert in pharmacopœial work and a man of world-wide fame, Dr. Hager has never been called upon to participate in the elaboration or the revision of a pharmacopœia; nor has he ever received, from the Government or the State authorities, any public recognition or distinction for his eminent merits for the advancement and the reputation of German pharmacy; whereas the profession of many countries has paid its respects to the great master by enrolling his famous name in the lists of honorary membership in their national associations—first among them the American Pharmaceutical Association and several colleges of pharmacy in the United States.

As long as pharmacy remains a distinct profession and retains its glorious history, the names of *Hermann Hager* and *F. A. Flückiger*[1]

[1]Amer. Jour. of Phar. (1895), Vol. 67, p. 65.

will stand foremost among the few bright stars in the galaxy of pharmaceutical master minds during the second half of the nineteenth century. Hager has set himself the most enduring monument by his life work and writings, and should the present or the succeeding generation of pharmacists erect some worthy memorial to the most deserving pharmaceutical author and mentor of his time, these words might well be inscribed with particular application and truth:

"Das Edle in der Menschenwelt,
Es lebt im menschlichen Gemüthe.
Es ist nicht Macht, nicht Gut und Geld,
Es ist ein Herz voll Lieb' und Güte,
Es ist ein Sinn voll Thatenkraft,
Der zielbewusst das Höchste schafft."

LEIPZIG, March, 1897.

A BRIEF RÉSUMÉ OF ACETIC ANHYDRIDE IN OIL ANALYSIS, AND A MODIFICATION OF THE METHOD FOR ESTIMATING MENTHOL IN OIL OF PEPPERMINT.

BY LYMAN F. KEBLER.

It is well known that the official requirements for some of the essential oils are not rigid enough, on the one hand, to detect all forms of adulterations or manipulated products, while, on the other hand, some of the qualitative tests are so exacting as frequently to discriminate very unfavorably against genuine oils produced in large quantities in the United States. Just where to draw the line at present is, in many cases, a difficult problem—a problem which will probably never be solved in some cases, for the ingenious adulterator always aims to debase his goods in such a manner as to make the fraud difficult of detection.

The chemical investigations of essential oils, during recent years, are contributing much toward laying the foundation on which to base analytical methods. In some cases simple and efficient processes for estimating certain valuable constituents have already been formulated. Methods that are no more difficult of application than those commonly employed for determining the quality of fixed oils. In fact, some methods are common to both, as the one in which acetic anhydride is used.

The value of acetic anhydride as a chemical reagent has long been known to organic chemists. But it was left for the genius of the late Dr. R. Benedikt[1] to formulate a qualitative method embodying the well-known property of acetic anhydride.

The method is based on the principle that alcohols and hydroxy acids on being heated with acetic anhydride, have the hydrogen atom of the hydroxyl group replaced by the acetyl group, thus forming compound ethers.

The process, according to Benedikt and to Benedikt[2] and Ulzer, is briefly as follows: from 20 to 50 grammes of the fatty acids are boiled with an equal weight of the acetic anhydride for two hours in a flask provided with an inverted condenser. The mixture is then transferred to a suitable vessel, about 600 c.c. of hot water added and boiled for half an hour. The mixture is then allowed to separate into two layers, the aqueous portion withdrawn and the oily layer treated thrice more in the same manner. The acetylized products are then filtered in a drying oven to eliminate all moisture. From 3 to 5 grammes are carefully weighed off and dissolved in pure alcohol. In this alcoholic solution the acid and the ether values are determined as usual. The former is called the *acetyl acid value*, the latter the *acetyl value* and the sum of both is termed the *acetyl saponification value*.

The theory of the process can readily be seen from the following equations:

$$\underset{\text{Cetyl Alcohol.}}{C_{16}H_{33}OH} + \underset{\text{Acetic Anhydride.}}{(C_2H_3O)_2O} = \underset{\text{Cetyl Acetate.}}{C_{16}H_{33}O.C_2H_3O} + \underset{\text{Acetic Acid.}}{HC_2H_3O_2}.$$

$$\underset{\text{Cetyl Acetate.}}{C_{16}H_{33}O.C_2H_3O} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Cetyl Alcohol.}}{C_{16}H_{33}OH} + \underset{\text{Potassium Acetate.}}{KC_2H_3O_2}$$

$$\underset{\text{Ricinoleic Acid.}}{C_{17}H_{32}(OH)CO_2H} + \underset{\text{Acetic Anhydride.}}{(C_2H_3O)_2O} = \underset{\text{Acetyl Ricinoleic Acid.}}{C_{17}H_{32}O.C_2H_3O.CO_2H} + \underset{\text{Acetic Acid.}}{HC_2H_3O_2}$$

$$\underset{\text{Acetyl Ricinoleic Acid.}}{C_{17}H_{32}O.C_2H_3O.CO_2H} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Acetyl Ricinoleate of Potassium.}}{C_{17}H_{32}O.C_2H_3O.CO_2K} + H_2O$$

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[1] 1887, *Ztschr. f. d. Chem. Ind.*, 1, 149, communicated Feb. 26, 1886.

[2] 1887, *Monatshefte für Chemie*, 8, 47; 1892, Die Analyse der Fette und Wachsarten, zweite Auf., p. 113; 1895, Chemical Analysis of Oils, Fats, Waxes, etc., by Benedikt and Lewkowitsch, p. 127.

$$\underset{\text{Acetyl Ricinoleate of Potassium.}}{C_{17}H_{32}O.C_2H_3O.CO_2K} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Potassium Ricinoleate.}}{C_{17}H_{32}(OH)CO_2K} + \underset{\text{Potassium Acetate.}}{KC_2H_3O_2}$$

J. Lewkowitsch[1] has studied the above process very thoroughly, and is continuing his work at present.

In 1894 F. B. Power[2] and C. Kleber proposed an analogous method for estimating menthol in oil of peppermint. The method is briefly as follows: About 20 grammes of the oil are mixed with 30 c.c. of normal alcoholic sodium hydroxide, in a flask provided with a reflux condenser and heated to boiling for one hour. The uncombined alkali is estimated by means of normal sulphuric acid, using phenolphthalein as indicator. Each cubic centimeter of the standard alkaline solution consumed represents 0·156 gramme of menthol in the form of ethers.

The contents of the above flask are repeatedly washed with water, to remove the alcohol present and the oily portion boiled one hour with an equal volume of acetic anhydride and 2 grammes of fused sodium acetate in a flask provided with an inverted condenser, the end of the condenser tube being so ground as to fit accurately into the neck of the flask. On cooling, the contents of the flask are washed with ample water, then with a dilute alkaline solution, the alkalinity removed by washing with water again, and the oily portion ultimately dried with calcium chloride and filtered. From 8 to 10 grammes of the acetylized oil are treated as above for estimating the combined menthol.

From the data obtained by the above procedure the total per cent. of menthol, free and in the form of ethers, may be calculated by the following formula:

$$P = \frac{a \times 15{\cdot}6}{S - (a - 0{\cdot}042)}$$

P equals total menthol; S equals grammes of acetylated oil used; a equals the number of cubic centimeters of normal sodium hydroxide required for saponification; and 0·042 is a constant obtained by

[1] 1890, *Proc. Chem. Society*, 72 and 91; *J. Soc. Chem. Ind.*, 9, 660.

1890, *J. Soc. Chem. Ind.*, 9, 846; Chemical Analysis of Oils, Fats, Waxes, etc., 1895, by Benedikt and Lewkowitsch, p. 129.

[2] 1894, *Pharm. Rundschau*, 12, 157; *Circular of Information, No. 3*, by Fritzsche Brothers, p. 12.

subtracting the normal factor of menthol (0·156) from the normal factor of menthyl acetate (0·198).

The two following equations form the basis of the process:

$$\underset{\text{Menthol.}}{C_{10}H_{19}OH} + \underset{\text{Acetic Anhydride.}}{(C_2H_3O)_2O} = \underset{\text{Menthyl Acetate.}}{C_{10}H_{19}O.C_2H_3O} + \underset{\text{Acetic Acid.}}{HC_2H_3O_2}$$

$$\underset{\text{Menthyl Acetate.}}{C_{10}H_{19}O.C_2H_3O} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Menthol.}}{C_{10}H_{19}OH} + \underset{\text{Potassium Acetate.}}{KC_2H_3O_2}$$

Being frequently requested to estimate the amount of menthol in peppermint oils on short notice, the writer has modified the above procedure so that the per cent. of this constituent can readily be estimated in three hours, while the original method requires the greater part of a day for execution.

For Estimating the Combined Menthol.—Place from 10 to 12 grammes (accurately weighed) of the oil into a suitable flask, add about 12 c.c. of normal alcoholic sodium hydroxide, connect the flask with an inverted condenser and boil for one hour. Retitrate the excess of alkali by means of standard sulphuric acid, using phenolphthalein as indicator. Each cubic centimeter of standardized alkali consumed corresponds to 0·156 gramme of menthol as esters. This part of the process embodies the well-known principle of Koettstorfer.

To Estimate the Total Menthol.—Place from 12 to 15 grammes (accurately weighed) of the oil into a suitable flask (the writer uses an ordinary Kjeldahl digesting flask), add an equal weight of acetic anhydride, 2 grammes of anhydrous sodium acetate, attach to a reflux condenser and boil the contents of the flask one hour. Allow the mixture to cool somewhat, transfer to a 250 c.c. separatory funnel, with successive portions of distilled water, using about 150 c.c. Agitate the funnel and contents well, set aside a few minutes, so that the mixture will separate into two layers. Withdraw the aqueous layer and wash again with 150 c.c. of water as above. Having removed the second wash water, add 50 c.c. of water, a few drops of phenolphthalein solution, and just enough of a 5 per cent. aqueous sodium hydroxide solution to render the contents of the funnel pinkish, after thoroughly agitating; then add enough water so that the aqueous portion will amount to about 150 c.c.; agitate well, allow the mixture to separate and withdraw the alkaline aqueous solution. Wash the oily layer again with 150 c.c. of water as above. Remove the water as completely as possible and transfer the acety-

lized oil to a suitable flask, using a small amount of alcohol to transfer the last portions. To the oil in the flask add from 50 to 60 c.c. of normal alcoholic sodium hydroxide, connect the flask to an inverted condenser and boil for one hour. Retitrate the excess of the alkaline solution by means of normal sulphuric acid. Each cubic centimeter of normal alkali combined corresponds to 0·156 gramme of menthol.

On deducting the amount of menthol contained in the oil in the form of esters from the total menthol found, we have the amount of free menthol.

The table on next page contains the results obtained by the above process for commercial menthol and a number of samples of oil of peppermint in connection with the specific gravities, boiling points and residues. The boiling points were determined with metallic bath.

It requires only a casual review of the contents of the table to show that oil of peppermint is a most variable product. Then when we call to mind that normal Japanese oil generally contains about 75 per cent. of menthol, the variation is still greater. But it must also be remembered that an oil containing a high percentage of menthol frequently does not possess the desired fine aroma so valuable in essential oils. The quality of the aroma is generally indicated by the amount of menthol esters. Yet, there may be some disturbing elements present, such as the sulphur compound, recently discovered,[1] which will vitiate an otherwise fine aroma very materially.

The writer has every reason to think that the oils examined above are genuine, excepting, of course, the sample marked "Unknown." This was highly adulterated with turpentine, as the boiling points clearly show.

In examining oil of peppermint it is necessary to determine: (1) the specific gravity, although this is only an indication; (2) the boiling point, varying from a few degrees below 200° C. to about 230° C. (uncorrected), with some residue; (3) the amount of menthol. The combined menthol varies from 3 to 16 per cent. The total menthol may vary from 30 to 80 per cent. These data, in connection with the aroma and identity tests, will undoubtedly show the character of any oil of peppermint.

[1] 1896, C. Kleber, *Pharm. Review*, 14, 269; Schimmel & Co.'s *Semi-annual Report*, October, p. 48.

Source.	Specific Gravity at 15° C.	Per Cent. of Menthol as Esters.	Per Cent. of Free Menthol.	Per Cent. of Total Menthol.	Number of c.c. Distilled from 50 c.c. of Oil between											
					*?–200	200–205	205–210	210–215	215–220	220–225	225–230	230–235	235–240	240–250	250–260	Residue.
					†?–204·8	204·8–209·9	209·9–214·	214 – 219·1	219·1–224·2	224·2–229·3	229·3–234·4	234·4–239·44	239·44–244·56	244·56–254·7	234·7–264·85	— —
Commercial Menthol,	—	None	99·66	99·66	M. P. 43	B. P. 212	—	—	—	—	—	—	—	—	—	—
Western	0·9112	3·72	29·02	32·48	2	3	4	5	7	3	5	4	2	3	6	6
Michigan	0·9065	3·06	28·25	31·33	2	3	6	9	11	7	4	3	—	—	—	5
Michigan	0·9147	4·51	29 92	34·43	2	4	5	6	7	4	3	3	3	2	4	7
New York	0·9·43	8·07	44·83	52·90	6	9	10	9	7	4	1	1	—	—	—	3
New York	0·9099	7·31	45·43	52·74	11	6	17	11	2	1	—	—	—	—	—	2
Michigan	0·9099	10·00	40·87	50 87	5	8	15	10	8	2	—	—	—	—	—	2
Unknown	0·8937	8·30	14·94	23·24	30	1	2	3	2	1	1	1	1	—	—	8
Michigan	0·9279	16·06	31·55	47·61	6	7	7	7	5	4	8	—	—	—	—	6
Mixture of Michigan and New York . . .	0·9079	4·68	38 30	42 98	4·5	4 5	9	11·5	10	4·5	2	—	—	—	—	4

* Degrees centigrade, uncorrected.

† Degrees centigrade, corrected.

It is hoped that the Pharmacopœial Committee will find it desirable to introduce the boiling point of this oil, at least, into the next revision of the Pharmacopœia, if they do not see their way clear to admit a method for determining the per cent. of menthol. But the writer cannot see any reason why a simple method like the above should not be made serviceable, seeing that good acetic anhydride can be so reasonably secured.

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SOME OBSERVATIONS ON ACACIA OF COMMERCE.

BY J. HENRY SCHROEDER, PH.G.

Of all the drugs sent forth into the commerce of the world, there is, perhaps, no single one of which there exist so many varieties as of acacia. A difference in the source of production is one cause for the variableness in quality of the commercial article. In some cases the quality of the gum is lowered by the season of collection, and a secondary grade is obtained by assorting the other varieties.

The chemical literature relating to the exact nature of the gums of different species of acacia is only limited, and they have, so far, been subjected to little thorough study.

As their habitats vary greatly, they are usually known by the names of the localities where they are collected, or by the names of the ports from which they are shipped.

For pharmaceutical uses the U. S. Pharmacopœia directs that the gum of Acacia Senegal be employed.

It was with a view of determining the presence of dextrin in the powdered commercial "gum arabic," that an examination of different samples was undertaken.

It has been alleged that the high price of a good quality of gum has tempted those who handle the product, and that many of them have resorted to adulteration for pecuniary gain, dextrin being the substance usually employed for the purpose. While for merely technical purposes an addition of dextrin might not be a disadvantage, such adulterated gum is, of course, unfit for pharmaceutical purposes, especially for the preparation of emulsions.

Observations were made during the work, which I think of sufficient interest to the pharmacist to report.

Before submitting in detail the results of the examination, I desire

to state that they are presented solely on account of the interest which they seem to possess for the practical pharmacist, with the consciousness that, considered as a scientific investigation, the important factor, completeness, is lacking.

According to the U. S. Pharmacopœia, acacia is "a gummy exudation from *Acacia Senegal*, Willdenow (nat. ord. *Leguminosæ*). Besides the description of the physical appearance of the gum, the following tests are also given:

(*a*) Acacia should be soluble in 2 parts of water; it should yield a gelatinous precipitate with basic lead acetate, T. S., ferric chloride, T. S., or concentrated solution of sodium borate, and does not reduce alkaline cupric tartrate, V. S.

(*b*) The powder is not colored blue (absence of *starch*), or red (absence of *dextrin*), by iodine, T. S.

In addition to these tests, it may be of interest to refer to two others for the presence of dextrin.

One, which is from Hager, Hartwich and Fischer's *Commentar zur Pharm.*, B. II, p. 44, is as follows:

"Three c.c. of a solution composed of 15 drops of solution of ferric chloride, 15 drops of saturated solution of potassium ferricyanide, 5 drops of diluted hydrochloric acid (sp. gr. 1·165) and 60 c.c. of distilled water, are added to 6 c.c. of a solution of the suspected gum (strength of solution should be 20 per cent). If the gum be devoid of dextrin, it will be colored a pure yellowish-brown tinge, this color remaining permanent during eight to ten hours. If dextrin be present, the color will change in about one hour to blue."

The other test, which is evidently a modification of the above method, is described in *El Memorandum*.[1]

It seems to be erroneous, inasmuch as it contains potassium *ferro*cyanide instead of potassium *ferri*cyanide, in presence of ferric chloride. The sulphuric acid present in the solution does not prevent the precipitation of ferric ferrocyanide. This test seems, therefore, inapplicable.

The foregoing are the tests upon which the examination of samples of commercial gum arabic was based.

While I was examining samples of the powdered gum in regard to their action upon alkaline cupric tartrate, V. S., I noticed that,

[1] *Pharm. Jour.*, October 12, 1895, p. 322, and *Proc. Am. Pharm. Assoc.*, Vol 44, p. 625.

in every instance, a marked reduction was taking place. A repetition of the experiments verified this observation. I decided to apply the test to a sample of the whole gum. For this purpose the best gum (answering the Pharmacopœial description in physical appearance) obtainable was employed. One gramme was pulverized in a clean mortar, and dissolved in 10 c.c. of recently distilled water.

Just sufficient potassium hydrate solution was added to give an alkaline reaction, and this solution heated with alkaline cupric tartrate, V. S., in a water-bath (boiling temperature), during twenty minutes. Here, too, a well-defined reduction was observed, though seemingly less prominent than that produced by an equal amount of the *powdered* substance. When the test solution was heated, without the solution of gum, for an equal length of time, it remained clear. A like behavior of acacia is described in Hager, Hartwich and Fischer's *Commentar*, as follows: "Acacia does not reduce Fehling's solution at 60°–70°, but has a reducing action after being boiled with the reagent," and "dried gum in solution reduces Fehling's solution at temperature of water bath." I have observed, however, that gum, not otherwise than air-dried, reduces Fehling's solution without being boiled, upon heating a solution for some time at water bath temperature.

The increased reduction by the powdered gum is probably due to drying previous to powdering it.

The iodine test for dextrin and starch was applied to each sample in powder and in the form of solution. When applied to the same powder it imparts to the powder only a light yellowish color of the iodine. If only traces of dextrin are present a dark red tint is produced. When a larger quantity of dextrin is present, the color produced by a few drops of the reagent is almost black. If starch and dextrin be present in the same sample, they can hardly be distinguished. One minim of the official T. S. of iodine will produce a decisive tint in solution of dextrin in distilled water, in proportion of 1 of the former to 2,000 of the latter. The presence of gum does not interfere with this reaction.

As commercial dextrin is not a product of definite composition and constant proportions, the delicacy of the iodine test may, of course, vary accordingly.

As all the samples of gum gave negative results with iodine,

traces of dextrin and starch were added to the sample under examination; the reagent in all cases gave prompt indication of their presence, showing that there was present in the original sample nothing to mask the reaction.

The potassium ferricyanide reaction did not give satisfactory results. The test solution was prepared as above described from clear crystals of potassium ferricyanide, previously washed with distilled water to free it from any adherent ferrous salt, which might have formed by exposure to light. By reduction with the ferric chloride it produced a pure yellowish brown color, without a bluish shade, proving the absence of ferrous salt.

(*a*) When diluted with distilled water, it remained unchanged during twelve hours.

(*b*) A 1 per cent. solution of dextrin in distilled water caused almost immediate reduction and consequently a blue color.

(*c*) The reaction with finely powdered gum arabic proved somewhat less rapid than that with pure dextrin, but the blue color was produced within twenty minutes (powder free from dextrin by iodine test).

(*d*) Powdered gum arabic, adulterated with dextrin, reduced the solution after a few minutes' time.

(*e*) When a tear of the gum was dropped into the solution of potassium ferricyanide, the solution did not acquire a blue color within two hours; but after standing a few minutes the outer surface of the tear of gum was colored a decidedly bluish tinge. When a tear of the gum was powdered, and then some of the potassium ferricyanide solution added, reduction with formation of a blue color took place more rapidly, agitation increasing the action.

Is it not possible that the drying of the gum or that other influences cause a change to take place in the gum acacia, which might account for the reaction with alkaline cupric tartrate and potassium ferricyanide solutions?

In order to determine the quality of the commercial powdered acacia, the samples were obtained, as far as possible, from the source of supply of the market, though the majority were obtained in pharmacies in Ohio, Indiana, New York, Pennsylvania and New Jersey.

All the samples were tasteless, and all reduced Fehling's solution, as described in the first part of this contribution.

TABULATED RESULTS OF EXAMINATION.

Sample.	Color of Sample.	Color of Solution.	Dextrin.	Starch.	Color, when Heated with KOH.
U. S. P. . . .	Almost white.	Very light.	None.	None.	Amber.
Gran. gum	White.	Very light.	None.	None.	Amber.
Powder *a* . .	White.	Yellow.	None.	None.	Amber.
" *b* . . .	White.	Yellow.	None.	None.	Amber.
" *c* .	Gray.	Dark brown.	None.	None.	Yellowish-brown.
" *d* . . .	White.	Very light.	None.	None.	Amber.
" *e* . .	Yellowish.	Yellow.	None.	None.	Amber.
" *f* . . .	White.	Light.	None.	None.	—
" *g* . . .	White.	Light.	None.	None.	Amber.
" *h* . . .	White.	Yellow.	None.	None.	Amber.
" *i* . . .	White.	Light.	None.	None.	—
" *k* . . .	White.	Light.	None.	None.	—
" *l* .	White.	Light.	None.	None.	—
" *m* . .	White.	Very light.	None.	None.	Amber.

These results seem to indicate that the cheaper grades of gum are most frequently employed in the preparation of the powdered article, and that adulteration with dextrine is not generally practised.

Of course, the samples examined were only such as are used in pharmacies; and, no doubt, for technical purposes, one might be able to purchase gum wherein dextrin might be revealed.

To all who have favored me with samples of the gum, my sincere thanks are due.

CINCINNATI, O., March, 1897.

PROXIMATE ANALYSIS OF ORRIS ROOT.

BY S. ALLEN TUCKER.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 162.

What is known in commerce as orris root is the rhizome of Iris florentina, which has been deprived of its cortex and dried by exposure to sunlight. Orris root has a delicate aroma, and for this reason it finds extensive use in the manufacture of perfumes, floral extracts and tooth-powders. For these purposes the prepared rhizome

is reduced to a granular form or a fine powder. It was on account of the extensive use of orris root, and because no statement of the effect of solvents on the article is given, that the writer undertook this proximate analysis. It is well known, however, that some of the proximate principles have been pretty thoroughly investigated by Dumas, Landerer, Flückiger and Hager; especially is this true of the volatile oil and its stearopten.

A sample of the granular form of the prepared rhizome was ground to a very fine powder. Petroleum ether extracted wax and fat to the extent of 1·34 per cent. Ethyl ether afterward dissolved 1·83 per cent. of substances which were soluble in alcohol and benzole, but not soluble in acidulated water. This extract had a strong odor of orris root. The substances to which this odor was due were not soluble in water. The alcoholic solution of the extract gave precipitates with alcoholic solutions of ferric chloride and lead acetate.

Absolute alcohol removed 4·13 per cent. of the weight of the rhizome. About three-fourths of the extract were soluble in water. This solution contained small amounts of glucose and sucrose. It gave a precipitate with lead acetate solution.

The distilled water extract amounted to 14·02 per cent. This included 8·31 per cent. of glucose, 1·27 per cent. of sucrose and a small amount of substances precipitable by alcohol. The total organic solids dissolved by water made alkaline with sodium hydrate were found to be 30·30 per cent. This extract consisted almost entirely of mucilaginous and albuminous substances which were precipitated by acidifying with acetic acid and adding a large volume of alcohol. Water acidulated with hydrochloric acid extracted 10·30 per cent. of organic matter. Starch was present to the extent of 16·85 per cent. A cold infusion of the rhizome gave no precipitate with gelatin for tannin. The sample of orris root examined contained 8·74 per cent. of moisture and 2·12 per cent of ash. The ash contained calcium, magnesium and potassium as carbonates, chlorides and phosphates.

In addition to the foregoing percentages representing the extracts, starch, moisture and ash, 10·37 per cent. of cellulose and undetermined substances were present.

MARRUBIIN AND ITS DICHLORINE DERIVATIVE.

By Harry Matusow.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 163.

This crystallizable principle, obtained from Marrubium vulgare, a plant belonging to the natural order Labiatæ, was first isolated by Mein in 1855, and investigated by Harms, to whom the former presented it for investigation.

Harms (*Archiv der Pharmacie*, No. 83, p. 144, August, 1855), then, upon investigation, ascribed to marrubiin the following properties:

"Marrubiin forms stellate groups of colorless needles; it melts at 148° C., and at a higher temperature it breaks up with the development of an unbearable odor; it is almost insoluble in water, easily soluble in alcohol—particularly in hot alcohol—and soluble in ether. Its taste is persistently bitter; and it possesses a tendency to become colored when exposed to the air."

The next investigator to take up the subject was Kromayer (*Archiv der Pharmacie*, No. 108, p. 258, 1861), who extracted the plant with boiling water precipitated the infusion with lead acetate, removed the excess of lead with hydrogen sulphide, and then concentrated the infusion to a syrupy consistence. He then obtained the crystals from the infusion by means of alcohol and purified them by treating with animal charcoal.

Kromayer's results, which were published simultaneously with the process of extraction briefly described above, were as follows:

"From ethereal solutions it crystallizes in colorless rhombic plates, or thick, four-sided, double, gypsum-like crystals.

"From alcoholic solutions it crystallizes in needles.

"The crystals are gritty between the teeth. On account of their sparing solubility in water, their bitter taste is not perceived until after being kept in the mouth for some time.

"Alcohol or ether dissolves it readily.

"The alcoholic solution tastes intensely bitter, and has a somewhat acrid after-taste.

"The alcoholic solution reacts perfectly neutral. Almost completely insoluble in cold water and only sparingly soluble in hot water.

"The hot-water solution of marrubiin tastes strongly bitter.

"On the addition of water to the alcoholic solution, the marrubiin separates as an oily liquid, and the mixture becomes milky; on adding some alcohol and allowing the solution to rest, the marrubiin crystallizes out in needles.

"When heated on platinum foil, marrubiin melts to a colorless liquid; more strongly heated, it gives off white fumes of a biting and irritating odor, and finally burns away completely without leaving any ash.

"When heated in a glass tube closed at one end it distills over in oily drops without leaving a residue, developing at the same time mustard-oil-like, piercing fumes.

"The melting point of marrubiin lies at 160° C.; on cooling it solidifies to a beautiful, radiating, crystalline mass.

"Marrubiin is not a glucoside. Concentrated sulphuric acid dissolves it rapidly, with a brown-yellow color. On the addition of water the color disappears with the separation of gray flakes.

"Concentrated hydrochloric acid, whether hot or cold, has no effect on marrubiin.

"Cold concentrated nitric acid does not affect it, but on heating dissolves it with a yellow color.

"Tannin does not precipitate a solution of marrubiin.

"By the action of alkalies, cold or warm, marrubiin is not perceptibly affected.

"Ammoniacal silver nitrate solution, on being boiled with marrubiin, is only slightly reduced. Marrubiin, consequently, is not an aldehyde-like body.

"Marrubiin is not precipitated by metallic salts, namely, ferric chloride, when applied, did not produce any change.

"In its properties marrubiin stands nearest to coumarin, $C_{18}H_6O_4$; to cinnameïn (meta-cinnameïn) = $C_{32}H_{14}O_4$ = $C_{14}H_7O$, $C_{18}H_7O_3$ (benzoyl-cinnamate); and to styracin = $C_{36}H_{16}O_4$ = $C_{18}H_9O$, $C_{18}H_7O_3$ (cinnamyl-cinnamate)."

In addition to the foregoing results quoted from him, Kromayer remarks that marrubiin is the first instance of a crystalline separated bitter principle from a plant belonging to the Labiatæ, a family which is so rich in ethereal oils, and that all the characters of marrubiin indicate its intimate relation to the ethereal oils.

In 1863 Harms published a second communication on the properties of marrubiin, in *Archiv der Pharmacie*, No. 116, p. 141.

In this case Harms obtained the bitter principle by treating the herb with three successive portions of hot water, evaporating the water extractions to a syrupy consistence, and treating them with alcohol; to the alcoholic solution he added a large quantity of sodium chloride and about one-third its volume of ether; the whole was then agitated and the separated ethereal layer, when drawn off and allowed to evaporate spontaneously, left tabular crystals of marrubiin, which, after two re-crystallizations from alcohol, appeared pure. From 25 pounds of herb Harms obtained 2 grammes of the crystalline bitter principle.

With reference to the properties of marrubiin, Harms says he found them, in general, to agree with those given by Kromayer.

An elementary analysis, which Harms made on a portion of the crystals presented to him by Mein, yielded from 0·313 gramme of the principle, dried at 90°–100° C., 0·240 gramme of H_2O, or 8.52 per cent. of H. The carbon estimation, unfortunately, was lost, but it showed that the marrubiin contained more than 69 per cent. of carbon. Harms also stated that on recrystallizing marrubiin from hot solutions a portion of it assumes an amorphous form. On dissolving the amorphous bitter principle in alcohol, and allowing the solution to stand at the ordinary temperature in the air, it goes over into its original form, and separates in a crystalline, wart-shaped mass. Marrubiin crystallizes easily—best when to a boiling alcoholic solution boiling water is added until it begins to become turbid, and the solution allowed to cool slowly.

In the AMERICAN JOURNAL OF PHARMACY for June, 1890, Hertel published the following experience:

On making a fluid extract of marrubium, using diluted alcohol as a menstruum, it was noticed that, after standing for a week, a deposit of well-defined crystals separated from the extract. The deposit from 10 pounds of herb was nearly 1 ounce, the extract, however, still being as bitter as before. The slight yellow color of the needle-shaped crystals was removed by several recrystallizations from alcohol. The crystals still retained their slowly-developing but persistently bitter taste. When heated on platinum foil the crystals melted, then charred and finally volatilized without leaving any residue. They were quite soluble in chloroform, alcohol and ether, and slightly soluble in water. The principle is insoluble in benzin, is not colored by acids, does not respond to Fehling's

test for sugar, nor to the alkaloidal group-reagents, and from its alcoholic solution is not precipitated by lead subacetate. It crystallizes best from cold alcohol.

A menstruum prepared from 2 parts of alcohol and 1 part of water, with 5 per cent. of glycerin, yielded a fluid extract remaining free from crystalline deposit.

The investigation of marrubiin was next taken up by Morrison, who published his results in the AMERICAN JOURNAL OF PHARMACY, July, 1890. Morrison obtained the marrubiin by extracting the herb with ether, and purified it by repeated crystallization from hot 95 per cent. alcohol, and subsequent treatment with animal charcoal. Morrison describes the properties of marrubiin as follows:

The crystals were insoluble in water and in solution of potassium hydrate, very sparingly soluble in boiling water and in cold alcohol. It is soluble in hot 95 per cent. alcohol, also in ether and chloroform. The crystals melt at 152°–153° C. They were at first tasteless, but developed, when held on the tongue, a decided bitterness. The alcoholic solution was very bitter. Sulphuric or nitric acid gave a dark brown color; hydrochloric acid produced no change, and ferric chloride produced no change. This principle reduced Fehling's solution by boiling in a water-bath, without first heating with an acid. On boiling it first with acidulated water, a peculiar aromatic odor was developed; then on heating with Fehling's solution, an abundant precipitate of cuprous oxide was produced, thus showing it to be an easily decomposable glucoside.

The average of two combustions was:

	Found. Per Cent.	Calculated for ($C_{40}H_{58}O_{9}$) Per Cent.
C	70·25	70·38
H	8·42	8·50
O	21·33	21·12

The melting point of the marrubiin, obtained by Hertel, was also determined by Morrison and found to be 153·5°–154·5° C. Morrison remarks that this marrubiin was evidently nearly pure, and states that the average of three combustions made by him was:

	Per Cent.
C	70·54
H	9·08
O	20·38

Morrison further states that his results indicate the composition of marrubiin to be very close to that of absinthiin, $C_{40}H_{58}O_9$, a crystalline bitter principle obtained from wormwood, and described by Kromayer in *Archiv der Pharmacie*, No. 108, p. 120, but that it does not agree with all the properties described by Kromayer, who states that absinthiin melts at 120° to 125° C.

Thus far I have reviewed the history of marrubiin, and described the investigations and results of preceding workers. I shall now detail my own experience with the extraction of marrubium, for the isolation and purification of marrubiin, and describe the properties of that substance as observed by myself.

The herb was collected by the writer at Lawnside, N. J., in the months of July, August and September, 1896. It was carefully dried in a room, without exposure to direct sunlight. The herb was then finely ground, and trial extractions made with alcohol, benzol and acetone as menstrua, 500 grammes of the herb being subjected to the solvent action of each of the solvents named. Of the three different menstrua mentioned, acetone was found to be the most satisfactory one, extracting the largest quantity of the bitter principle and the least amount of foreign matter, with smallest quantity of menstruum.

Two and a half kilogrammes of the herb were now extracted with acetone, the acetone being, from time to time, recovered from the extract, and used again as menstruum. When the herb was practically exhausted, the acetone was recovered from the extract, by distillation, and the thick, syrupy mass which was left was treated repeatedly with hot benzol. The benzol solution was allowed to stand for twenty-four hours for marrubiin and resinous matter to separate. The mother liquid was then poured off, and the residue treated with a fresh portion of hot benzol and allowed to stand as before. This treatment was continued until relatively pure crystals of a yellowish color were obtained. The crystals were then repeatedly crystallized from hot alcohol, by solution and chilling, which, owing to the prevalent cool weather, afforded a rapid means of crystallization. They still retained a slight yellow tinge, which, however, was removed by treating them with animal charcoal. A portion of the syrupy mass obtained above, on distilling off the acetone, was treated repeatedly with hot alcohol, and allowed to stand for twenty-four hours after each treatment, without previous

treatment with benzol, but without success; the reason for this, I think, is the following: the crystals are accompanied in the extract, besides the coloring and other foreign matter, by what seemed to be a resinous substance, which was dissolved along with them by the alcohol, and separated with them from its solution, thus rendering it difficult for the bitter principle to crystallize; hot benzol, on the other hand dissolved the crystals and the resinous substance at first, but when allowed to stand for twenty-four hours, retained the greater part of the resinous substance in solution, and deposited the crystals with only a small quantity of the resinous substance adhering. When these impure crystals were treated with a fresh portion of hot benzol, the marrubiin was dissolved, but the contaminating resin, for the most part, did not go into solution. From the 2½ kilogrammes of herb extracted about 20 grammes of purified crystals were obtained.

These crystals melted at 154°-155° C., and on cooling solidified to a crystalline mass.

When treated with strong sulphuric acid a dark brown color was produced.

Strong nitric acid produced a similar reaction.

Strong hydrochloric acid produced no change, even on heating.

When Fehling's solution was heated with a hot-water solution of marrubiin on a water-bath for thirty minutes, it was not reduced.

Fehling's solution, when heated on a water-bath for thirty minutes with a hot-water solution of marrubiin, which had previously been boiled with hydrochloric acid, was not reduced.

The alcoholic solution of marrubiin has a neutral reaction.

The alcoholic solution of marrubiin, when treated with alcoholic ferric chloride, was not changed; alcoholic lead acetate produced no change; alcoholic tannin solution produced no change; ammoniacal silver nitrate solution, in the cold, was not reduced by a hot aqueous solution of marrubiin; the same reagent when heated in a water-bath was not reduced; but as the solution became more concentrated, the marrubiin gradually separated from solution on the bottom of the tube.

The alcoholic solution, as well as the crystals, had a persistently bitter taste. On the addition of water, the alcoholic solution becomes turbid white. Marrubiin crystallizes in lustrous needles arranged in star-shaped groups, from hot alcohol when not concen-

trated. From concentrated hot alcoholic solutions, it crystallizes in dull-white plates.

It is soluble in acetone, ether, alcohol, chloroform, but most readily in hot benzol.

It is insoluble in petroleum benzin and cold water, and only sparingly soluble in hot water.

Marrubiin, when tested for nitrogen, by fusing a small quantity of it with a fragment of metallic sodium, agitating the heated mass with water filtering, and adding ferrous sulphate, ferric chloride and hydrochloric acid in excess, did not give the characteristic blue precipitate or color of ferric ferrocyanide, $(Fe_2)_2.(Fe(CN)_6)_3$, thus indicating the absence of nitrogen.

The crystals obtained by recrystallization from hot alcohol, previous to being treated with animal charcoal, melted at 158°-159° C. They were subjected to ultimate analysis; the combustions were made in an open tube with copper oxide and a current of oxygen, the substance being, in all cases of combustion, previously dried in a desiccator over sulphuric acid for twenty-four hours.

The following are the results of two combustions:

(1) ·1931 gramme of the substance yielded:

·5113 gramme of CO_2 =	72·19	per cent. of C.
·1500 " " H_2O =	8·59	" " " H.
	19·22	" " " O.
	100·00	

(2) ·1659 gramme of the substance yielded:

·4414 gramme of CO_2 =	72·57	per cent. of C.
·1293 " " H_2O =	8·68	" " " H.
	18·75	" " " O.
	100·00	

The crystals were then recrystallized six times from hot alcohol, and a second determination of the melting point gave the same result as that obtained in the previous case, viz.: 158°–159° C.

They were, therefore, treated with animal charcoal in several successive applications, and the melting point, as proven by several trials, was found to be 154°–155° C. A combustion of the purified substance showed the following to be its percentage composition,

which is practically the same as that previously obtained; ·1654 gramme of the substance yielded:

·4372 gramme of CO_2 =	72·07 per cent. of	C.
·1305 " " H_2O =	8·77 " "	H.
	19·16 " "	O.
	100·00	

The average of the three combustions was:

	Found. Per Cent.	Calculated for ($C_{20}H_{48}O_6$). Per Cent.
C	72·28	72·14
H	8·68	8·62
O	19·04	19·24
	100·00	100·00

My results confirm Kromayer's, in general, excepting the melting point, which he determined to be 160° C. They also differ from the melting point stated by Harms to be 148° C.

The melting point obtained by myself is nearest to the one obtained by Morrison.

My results show that marrubiin is not a glucoside; so they also differ in that respect, as well as in the matter of its formula from the results obtained by Morrison.

Dichlorine Derivative of Marrubiin.—A small quantity of marrubiin was dissolved in ether and dry chlorine gas passed into the ethereal solution, until no more of the gas was absorbed.

The ethereal solution, which was of a yellow color, was divided into two portions, one portion being allowed to evaporate and the other poured into an excess of water. The portion poured into the water was stirred, the water poured off and the precipitated substance washed with successive portions of water and carefully dried. When dry, it was found in the form of a yellowish-white, hard, wax-like mass, adhering to the sides of the beaker. The portion of the ethereal solution which was allowed to evaporate left a thick, oily, yellowish-brown substance, which, when redissolved in ether and allowed to evaporate several times and then washed repeatedly with water, assumed a form similar to the substance obtained by pouring a portion of the ethereal solution into water.

A preliminary test for chlorine was made by heating a small por-

tion of the thoroughly washed substance with chlorine-free calcium carbonate on platinum foil. The mass was allowed to cool, then dissolved in water by the aid of nitric acid, and silver nitrate, T. S., added. This reagent produced a white, curdy precipitate of silver chloride insoluble in nitric acid.

To estimate the chlorine quantitatively, ·0813 gramme of the chlorine derivative was intimately mixed with chlorine-free calcium carbonate, and heated in a glass tube, closed at one end, until the carbon was completely burned off. The tube was then broken, and it and the contents were introduced into a beaker. Water was added, and the whole warmed and complete solution of contents effected by the aid of nitric acid. The solution was filtered clear, the filter carefully washed, adding the washings to the filtrate, and then precipitated with silver nitrate. The precipitate was collected. washed with hot water and dried at 130° C. to constant weight. The weight of silver chloride so produced was ·0425 gramme, which corresponds to ·0105 gramme of chlorine, or 12·91 per cent. of the weight of the derivative taken. Assuming that one hydrogen atom is replaced by every chlorine atom introduced, the formula of the derivative—admitting the formula for marrubiin to be $C_{30}H_{43}O_6$—would be $C_{30}H_{41}Cl_2O_6$, the theoretical amount of chlorine in which is 12·47 per cent.

Marrubiin dichloride is a yellowish-white, hard, wax-like substance, soluble in ether and alcohol, from which solvents, however, it could not be obtained in crystalline form, even after repeated attempts at crystallization.

When heated it becomes transparent at 63° C.

NOTE ON OINTMENT OF MERCURIC NITRATE.

By Joseph W. England.

Probably no official ointment has been more carefully studied than has the familiar citrine ointment. To the physician its medicinal action is peculiar and full of interest. Through its free nitric acid, when applied to an epidermis more or less altered by pathological change, it rapidly penetrates the superficial tissue, and sharply stimulates the subdermal tissue to absorb the soluble mercuric salt, thus inducing a local, and possibly, to some extent, a constitutional alterative action. The danger of salivation from a too

speedy absorption is such that many physicians dilute the ointment with fatty diluents in all cases, save those requiring strong stimulation. Whether the elaidin of the ointment is of any value in promoting absorption or not has not been determined.

Not alone from the medical standpoint, however, has the ointment been of interest, but its making has been the fruitful source of much study by pharmacists. Under the title of "Unguentum Hydrargyri Nitratis," an able paper by P. W. Squire, has been published in the *Pharmaceutical Journal* of London (February 27, 1897, 172), in which are given the results of experiments upon the nature of the fat, the relative quantity of nitric acid, and the manipulation used in making the ointment. Especial attention is paid to the differences between the processes of the British and United States Pharmacopœias. It is not necessary to here dwell upon these, save only in a general way.

Regarding the fat to be used, Mr. Squire prefers the British Pharmacopœia mixture of lard and olive oil, rather than the lard oil of the United States Pharmacopœia. He says that with lard oil the oxidation takes place at a lower temperature than with lard and olive oil, the resulting product being somewhat darker; otherwise, he frankly adds, there is not much to choose between the two fatty bases.

The relative quantity of nitric acid used in the B.P. process is considerably more than in the U.S.P., and while the U.S.P. treats the lard oil with a part of the nitric acid previous to the addition of the solution of mercuric nitrate, the B.P. directs that the acid solution of mercuric nitrate be added to the ointment base without any previous treatment with acid. The advantage of the first procedure over the sceond Mr. Squire admits, giving an alternative formula based on the B.P. formula, in which the fatty base is treated with half the nitric acid before the mercurial solution is added.

Mr. Squire finds that the temperature at which effervesence takes place varies with the nature of the mixture of acid and fat. With nitric acid and lard oil the reaction is slight at 100° C. (212° F.) and brisk at 110° C. (230° F.); with nitric acid, lard and olive oil, the reaction takes place at 120° C. (248° F.); with acid solution of mercuric nitrate and lard oil it occurs at about 90° C. (194° F.), and with acid solution of mercuric nitrate, lard and olive oil, at 95° C. (203° F.). The relatively higher temperatures of the first two in-

stances have no practical bearing if there be no mercuric salt present.

The important practical point to observe is that the temperature be kept low *after* the addition of the mercuric solution, when the tendency to blacken increases as the temperature rises. This change will occur even if the ointment be kept at 100° C. (212° F.) for anything like an hour, and possibly in much less time.

The interesting nature of Mr. Squire's communication suggested to the writer the advisability of reporting its data to American pharmacists, and also of making a few practical suggestions regarding the present U.S.P. process.

The following formula is suggested for trial:

	Grammes.
Red mercuric oxide	75·5
Nitric acid	175·
Lard oil	760·

Heat the lard oil in a glass or porcelain vessel to 100° C. (212° F.), withdraw heat, and gradually add 75 grammes of nitric acid. When the reaction moderates, reapply the heat until brisk effervescence takes place, and then withdraw heat until active effervescence subsides. Then gently heat until effervescence ceases. (During the effervescence stir the mixture with a wooden spatula or paddle.) Allow the mixture to cool to about 60° C. (140° F.). Having dissolved the red oxide of mercury in 100 grammes of nitric acid, with the aid of sufficient heat, add the solution gradually to the oxidized fat, and stir the product until cold. When nearly cold, add 50 grammes of glycerin, and admix thoroughly.

The advantage in using red mercuric oxide over mercury rests in the fact that small quantities of it are more easily weighed, and it is probably purer than commercial mercury. If it be desirable to employ red mercuric oxide for making the official solution of mercuric nitrate, it should be equally useful in making the ointment. The small quantity of water formed in the reaction is of no practical moment.

In the U.S.P. process, no directions are given for stirring the fatty mixture during oxidation, and the inference is that such a practice is to be tabooed. As a matter of fact, a diligent stirring of fat and oxidizing material facilitates oxidation, and in the writer's opinion is of decided advantage in hastening the end-reaction. If the

ingredients be not stirred during effervescence, there is a danger that the contents may be thrown from the container.

The reaction between the fat and acid is sometimes slow in responding, and when it responds it does so very quickly. For this reason the writer prefers to withdraw the heat on active effervescence, and then after the reaction is in operation, to heat gently until effervescence ceases, rather than to follow the official directions of heating until effervescence ceases after the addition of acid with primary reaction.

There is no apparent need of waiting until the temperature of the oxidized fat falls to 40° C. (104° F.) before adding the mercurial solution. Squire cools his product to 60° C. (140° F.), and this would seem to be a low enough temperature.

The red oxide of mercury "lumps" slightly on adding it to the acid, but heat soon brings it into solution.

Objection may be made to the addition of glycerin to ointment of mercuric nitrate, on the ground that nitro-glycerin may be formed. The objection is not well founded. The production of nitro-glycerin requires a large excess of concentrated sulphuric acid over the quantity of nitric acid used in order probably to absorb rapidly the water formed in the reaction, as follows:

$$C_3H_5(OH)_3 + 3NO_2{\cdot}OH = C_3H_5(NO_3)_3 + 3H_2O$$

This condition does not obtain in this ointment. In addition, the fat present doubtless inhibits such a change. Further, the writer has followed the practice of adding glycerin to the ointment for three years past, and there has been no complaint of untoward therapeutic effects, as there would have been had any nitro-glycerin been present; the latter is rapidly absorbed by the skin.

AQUA PURA.

Editor AMERICAN JOURNAL OF PHARMACY.

DEAR SIR:—In consideration of the condition of the drinking water supplied to the citizens of Philadelphia and some other cities, too, by their public works, it seems to me there is an excellent opportunity for the pharmacist to do a stroke of business as well as to assist his suffering fellow-beings to preserve their lives and enjoy a drink of pure water while still living. My suggestion is that

he constitute himself a purveyor of pure drinking water to his customers and neighbors by supplying them with filtered water. He can either sell this pure filtered water at a merely nominal price, say, 4 or 5 cents a gallon at his store, not delivered, or else give it away as an advertisement, and which, I think, would be more profitable than the selling of postage stamps for a similar purpose.

There are several good filters on the market that can be attached to the hydrant in the store, and need no attention except for cleaning every two or three days, and a proper receptacle for the filtrate; they will work on day and night alone. From this arrangement down to simple filtration through paper with a little magnesia, many ways of filtration will occur to the competent and skilful gentlemen for whose information and ultimate benefit this hint is intended.

I fancy I can see an extensive and profitable application of this hint to the business of many pharmacists.

A little admixture of plain carbonated water added to the filtrate would make it sparkle and be an improvement possibly.

The highest-priced filter on the market that I know of, filtering about 10 gallons an hour when clean, can be put up for $25, perhaps less, and from this through an endless variety of filters and methods, home-made or otherwise, the outfit can be reduced to a very small sum, according to quantity of filtered water required or attention needed to keep the work continuously going on.

Yours truly,

PRO BONO PUBLICO.

COMMON SENSE ON THE ALCOHOL QUESTION.[1]

However temperate a man's own views may be on any such question as that of the use of alcohol, he is tempted to lean in his public utterances toward the contention of fanatics. He may not go to the extremes that they contend for; indeed, he is almost sure not to. But he is apt to make statements by which they can strengthen their case with the public and especially with the legislators. It is refreshing to notice a recent exception in the case of Mr. Pellew, of the department of chemistry of Columbia University, who recently

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[1]Editorial in *New York Medical Journal*, March 8, 1897.

concluded a course of lectures in the Museum of Natural History on the subject of the good and bad effects of alcohol.

Mr. Pellew stated without reserve, and backed up his statement by citing the most careful observations and experiments of well-known investigators, that "there was no doubt that, even in health, a small amount of alcohol, if given in divided doses, could be burned up in the blood and serve as food, without producing any injurious effects." We are quoting from the *Sun's* report of Mr. Pellew's last lecture. He went on to say that in diseased conditions, where nutrition was impaired, alcohol could be given in greatly increased amounts without any intoxicating effect, and was then of enormous value. An ounce of it, he said, gave as much heat as seven or eight ounces of beef, and that without having to undergo the process of digestion and assimilation. In other words, it burned, "as in a lamp, without wasting the wick."

On the other hand, the popular notion that alcohol will keep up the heat of the body under exposure to great cold was declared to be a mistake. Alcohol, said Mr. Pellew, actually reduced the temperature of the blood, but it was of service to restore equilibrium after the exposure was over. The lecturer was not backward in depicting the horrors of drunkenness, to which, of course, no reasonable man can shut his eyes. He spoke of the dram-drinking habit as a nervous disease rather than a vice. He properly insisted that, in health, the only good effects of alcohol, "except, indeed, its action as a 'scavenger of mankind,'" came from its moderate use.

To show the astonishing amount of intemperance in the so-called temperance doctrines at present promulgated, Mr. Pellew read passages from the books on "physiology" to which the law now requires the teachers and pupils in the public schools of the State of New York to devote a large proportion of their time. He pointed out the "absurd doctrines, not to say absolute falsehoods," which in many cases were thus crammed into the children's heads. The *Sun's* account concludes as follows: "In his opinion it is confusing to a child to learn that it is a sin to pick a pocket and to drink a glass of wine, and he suggested the state of mind of a Teutonic father or grandfather, when his young hopeful would read to him, from his school books, how the 'use of beer, more than of any other liquid, tends to make the drinker selfish, cruel and brutal.'"

RECENT LITERATURE RELATING TO PHARMACY.

SOME COLOR REACTIONS OF TARTARIC, CITRIC AND MALIC ACIDS.

According to E. Pinerua (*Annales de Chimie Analytique*, 2, 66), the reagent for producing these color reactions is made by dissolving 0·02 gramme of β-naphthol in 1 c.c. of sulphuric acid, specific gravity 1·83.

The test is made by warming cautiously in a porcelain capsule 0·05 gramme of the organic acid with 10 to 15 drops of the reagent.

Tartaric acid, when thus treated, produces a blue color, which, under the gradual action of heat, becomes a pure green. If to the cooled mixture 15 to 20 times its volume of water are added, the green coloration passes to a reddish-yellow.

With *citric acid* the color at first produced is an intense blue, which does not become green on the further application of heat, and the mixture becomes colorless or only slightly yellow on the addition of 15 to 20 times its volume of water. If the citric acid contain only a small quantity of tartaric acid, the green color is produced by the latter.

Malic acid, when treated like the others, produces a greenish-yellow, quickly passing to yellow. The addition of water furnishes an orange color. All the reactions are produced quickly, and care and judgment must be used in applying heat.

THE ALLEGED CONVERSION OF CINCHONINE INTO CINCHONIDINE.

Messrs. B. H. Paul and A. J. Cownley (*Pharmaceutical Journal*, February 20, 1897) have investigated the alleged conversion of cinchonine into cinchonidine and reached the following conclusions with reference to their experiments: An endeavor to corroborate Koenig and Hussmann's statement as to the possibility of converting cinchonine into cinchonidine by the action of dilute potash was unsuccessful. The authors stated that if the supposition be made that the base obtained was really cinchonidine, it must be presumed that the cinchonine operated upon had not been sufficiently purified. It is well known to quinologists that the cinchona alkaloids are very prone to form double compounds with each other, either as alkaloids when separating from various solvents, such as ether and alcohol—the latter having been used by the authors—or as salts from aqueous solutions. Cupreine, for instance, which they isolated from Remijia pedunculata, forms a compound with quinine, viz.: homo-

quinine, which reacts whether as an alkaloid or as a salt, differing in many respects from either cupreine or quinine.

ESTIMATION OF MORPHINE IN OPIUM AND ITS PRINCIPAL PREPARATIONS.

Al. Grandval and H. Lajoux (*Jour. de Pharm. et de Chim.* [6], **5**, 153) recommend a process for the estimation of morphine which they claim is easy and rapid of execution, and yields a pure white morphine.

Opium is estimated by taking 10 grammes, triturating in a glass mortar with 40 grammes of distilled water, until the drug is finely divided, throwing on a folded filter and washing the mortar with 40 grammes of water, which are also poured on the filter. The mass is allowed to drain well, the filter and its contents are then returned to the mortar and triturated with 40 grammes of water added in several portions. The whole is then poured on a plain filter and washed with water until the washings are free from color and taste. The filtered liquid and washings are then evaporated on a water-bath to 13 grammes; to this residue are added 13 grammes of 95° alcohol, and the mixture is allowed to stand a half hour for the sulphate and meconate of calcium to deposit; it is then filtered through a small filter moistened with 60° alcohol, and the filter and precipitate are washed with alcohol applied drop by drop, so that not more than 10 grammes of alcohol have been used when the washing is complete. The edges of the filter are kept from drying during the washing by covering the funnel with a watch crystal. Ammonia is next added, drop by drop, to the liquid until the odor is just apparent, and the whole is agitated for some minutes, then set aside for twelve hours in a cool place. The precipitate of morphine and narcotine is collected on a plain filter, previously dried at 100°, tared and moistened with alcohol of 60°. When the liquid has run through, the precipitate is washed with alcohol of 40° until the filtrate runs colorless, when not more than 25 c.c. should have been used. The filter and its contents are then dried at 100°, weighed and returned to the funnel, where 5 c.c. of ether are added in order to permit the morphine being moistened by the chloroform; then 10 grammes of chloroform are added, which dissolve the narcotine. Finally the morphine and filter are dried at 100° and weighed. The morphine, being in the state of hydrate and crystalline, is not dissolved by the chloroform, which only dissolves morphine when in the state of anhydride.

Extract of opium is assayed by dissolving 5 grammes of the extract in 5 grammes of water, adding 5 grammes of alcohol of 95°, allowing to stand, and then transferring to a plain filter moistened with alcohol of 60°. The precipitate is washed with alcohol of 40°, there being required about 10 c.c.; the operation is then conducted in the same manner as under opium.

The liquid preparations of opium are assayed by slight modifications of the process which readily suggest themselves.

EDITORIAL.

SUBSTITUTION.

There has been a great deal said at the National and the various State Pharmaceutical Associations about substitution, and it is probable that much more will be said this year than ever before. It is scarcely necessary, however, to waste much time on a subject in which the plain line of duty is so clearly marked out for the pharmacist. Certainly, every physician has a right to specify any particular manufacturer's preparation, and the patient has a right to receive it. If the pharmacist to whom the prescription is presented for compounding does not care to furnish the product of the specified manufacturer, he has a right to decline and to return the prescription. He has no right, however, to substitute his own or anybody else's preparation for the one specified, even if he is sure the substitute is as good or, as he may think, better.

It is only justice to Fairchild Brothers & Foster to give them credit for going to considerable expense to bring certain guilty parties to justice, who have been palming off, not only substitutes but poor substitutes, in prescription for their essence of pepsin. The pharmacist who does not wish to dispense anybody's preparation but his own has a remedy; he can visit the physicians in his locality, load them up with samples of his own manufacture, and perhaps convince them that they are the best. At the same time it will pay him, morally, legally and financially, to supply just what is ordered.

THE EVOLUTION OF THE NOSTRUM.

We sincerely trust that certain nostrum manufacturers will not garble the preceding remarks and publish them as reading matter (paid for at double the advertising rates) in the newspapers; they are not intended for the patent medicine nabobs.

Substitution, as already defined, is almost impossible in the sale of patent medicines, but at the same time the products of the retail druggist are in many localities taking the place of nostrums. This has been brought about by the education of the public by the pharmacist as to the real nature of the numerous patent remedies whose virtues lie more in printers' ink than in intrinsic merit. To offset this disastrous warfare against their remedies, the nostrum manufacturers resort frequently to paragraphs like the following, which start in the city papers and gradually find their way into those of the smallest country towns:

GET WHAT YOU ASK FOR.

Certain Druggists Who Bring Reproach Upon Their Business by the Practice of Palming Off "Substitutes" on the Public.

When a person goes to a drug store for a standard remedy and the druggist tries to palm off some other preparation of a pretended similar nature, urging the customer to buy the latter concoction on the plea that "it is just as good" or "really better" than the standard remedy called for, it is proper to avoid that drug store ever afterwards.

The profit to the druggist on the standard preparations is not large. The few remedies that the whole world recognizes as meritorious are prepared by able physicians and chemists, with every facility of modern science at their command, from the formulas of the most learned physicians that this generation has produced. A tremendous amount of capital is invested in the laboratories where these remedies are made. They have gained their reputations by the great good they have done in curing disease and relieving pain. It costs a great deal to keep up their necessary excellence.

The unscrupulous and generally ignorant druggist referred to sees a chance to make a big profit by mixing together a number of cheap ingredients, giving the mixture a name, and taking advantage of the gullibility of some people, who seem to like to experiment with their health. These preparations are frauds, and are never advertised, because they will not bear the light of any public investigation.

This appeared as reading matter in the Philadelphia *Public Ledger*, and claimed to have been taken from the *Boston Globe*.

What is the "standard remedy" spoken of?

Evidently, from what follows, it is one which has been advertised.

When a customer asks for one of these so-called standard remedies, the pharmacist will not go far astray if he undertakes a little missionary work, and either sends the patient to a physician or supplies him (after due recommendation) with a standard preparation of his own manufacture, which, perhaps, has not been so extensively advertised, but which has real merit. The editor who admits such "stuff" and calls it reading matter should be waited on by the druggists of his locality and be enlightened as to the real facts of the case. Such notices have appeared quite frequently of late, and, no doubt, will continue to appear unless some active measures are taken by pharmacists. They indicate the desperate efforts of the nostrum manufacturers to neutralize the warfare which is being waged by druggists in nearly every part of the country against the patent medicine; but sooner or later the persistent aggressiveness of the 40,000 druggists in the United States will win. It is nonsense to talk of going back to the day of 33 or 50 per cent. profits on "patents," nothing moves that way in this world, the process of evolution is seen in everything, and this

miserable patent medicine traffic cannot go backward, it must gradually grow into something which we trust will be better.

A TESTIMONIAL TO PROFESSOR ATTFIELD.

The retirement of Dr. Attfield from professional life is an event in the history of pharmacy which should be marked by an acknowledgment of his long labors and important services.

Now some of his past pupils, who have been students personally, or students of one or more of the fifteen editions of his Manual of Chemistry, also a few of his public friends, have decided that the time has arrived for them to show, in some appropriate manner, the esteem and warm regard they have for him, and to ask fellow-students and their friends to join them in a scheme for this purpose.

Just what form the recognition will take has not been settled. Those who are willing to join in this testimonial should address Mr. John Moss, 39 Tressillian Road, London, S. E., for circulars and other information. The cash contribution, if any, is not to exceed ten shillings.

OHIO PHARMACEUTICAL ASSOCIATION.

The pharmacists of Ohio have decided to hold their annual meeting this year in Cleveland, during the second week of June. Detailed information can be had of Lewis C. Hopp, Secretary, 198 Euclid Avenue, Cleveland, Ohio.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

NORTH CAROLINA AND ITS RESOURCES. Illustrated. Issued by the State Board of Agriculture, Raleigh, N. C., 1896. 8vo., pp. 413.

This handsomely illustrated volume opens with a historical and general sketch of the State, and then treats of climate, forests, flora, fauna, geology, economic minerals, gems and gem stones, agriculture, horticulture, education, etc., etc. North Carolina has long been known as a State rich in economic products, and this book will do much to extend the knowledge of these products. The flora is especially rich in medicinal plants, and the supply of many native vegetable drugs has for years come from this State. The Welsbach and other incandescent lamps are dependent on the supply of monazite from McDowell and adjoining counties.

Biltmore, the famous estate of the Vanderbilts, receives careful consideration in this book, and it is shown to be a superior educator in agricultural matters to the farmers of the State.

Leaving the mountainous districts, as we approach the coast we find the turpentine industry of great importance. The annual value of the resinous products sold from the State aggregates over $1,500,000, being, in fact, about one-third of the entire product of these commodities in the world. On the coast the fish industry is of considerable magnitude. On reading this book one is almost forced to the conclusion that North Carolina is able to produce, within her boundaries, everything necessary for the comfort and well-being of the human race, and therefore is capable of being a small world within herself.

DIE FABRICATION DER KÜNSTLICHEN MINERALWÄSSER UND ANDERER MOUSSIRENDER GETRÄNKE. Von Dr. B. Hirsch und Dr. P. Siedler. Dritte neu-bearbeitete Auflage. Druck und Verlag von Friedrich Vieweg und Sohn, Braunschweig. 1897.

The whole subject of mineral waters is comprehensively treated under the following titles: *A*, Mineral waters in general; *B*, half-natural mineral waters; *C*, artificial mineral waters; *D*, mineral-water ingredients; *E*, apparatus; *F*, preparation of mineral waters; *G*, calculation of analyses; *H*, artificial medicinal waters not occurring in nature; *I*, testing of artificial mineral waters; *K*, beverages; *L*, laws, etc. In the first chapter the general subject is concisely and interestingly stated. The half-natural mineral waters are those which, on account of their agreeable taste, are desirable for table waters, but it is found necessary to fortify them by a further proportion of carbon dioxide, and, in some cases, also by the addition of common salt.

Much valuable information is given concerning the composition of natural mineral waters, and how the various acids and bases are combined with one another. Attention is called to the fact that many of these bases and acids do not ordinarily occur together in solution, but that their presence in the same mineral waters is made possible by carbon dioxide, and, in some cases, heat and pressure.

That portion of the book devoted to mineral water apparatus and the preparation of artificial waters is very full. Much of the apparatus is figured in the beautiful manner of Vieweg & Son, and for which they have a world-wide reputation.

The manufacture of carbonated waters is described in detail and fully illustrated. The manufacturer, chemist and pharmacist will all find this book one of value.

THE YEAR-BOOK OF TREATMENT FOR 1897. A critical review for practitioners of medicine and surgery. Lea Brothers & Co., Philadelphia and New York, 1897.

The thirteenth issue of the "Year-Book of Treatment" has appeared, with but few changes in the staff of contributors. Every branch of medicine has received careful attention in this summary. The conclusions regarding antitoxine are quite full, and the weight of evidence in favor of it as a remedial agent is overwhelmingly in the affirmative. The chapter on therapeutics of the year is chiefly in reference to new remedies, and contains much information of especial value to pharmacists.

ANNUAL OF THE MEDICAL SCIENCES AND ANALYTICAL INDEX. A yearly report of the progress of the general sanitary sciences throughout the world. Edited by Charles E. Sajous, M.D., Paris, and seventy associate editors. Five volumes. The F. A. Davis Company, publishers, Philadelphia, New York and Chicago.

The editor states in the preface to Volume I that his aim has been to add to the practical value possessed by the previous issues. From a general examination of the work, we can say that he has fully accomplished his purpose.

RAPPORT DE MISSION A LA MARTINIQUE ET A GUYANE. Par Emmanuel Geoffroy. Macon, France, 1897.

On account of the death of the author, the introduction to this report was written by Dr. E. Heckel, who clearly sets forth the object of the journey of exploration to Martinique and French Guiana; this object was to find, if possible, in the French colonies, trees yielding caoutchouc or other substance that would take its place, and to determine if the Araucarias of Brazil were to be found in French Guiana. The author himself answered these questions in his conclusions, by stating that the search for the forests of Araucarias was completely fruitless, and he did not believe they existed in that colony, as they are very conspicuous trees, and could not have escaped the observations of Aublet, Guisan and others. On the other hand, the trees yielding milky juice coagulable by alcohol, the Balatas, were found in great abundance. They were, however, in difficultly accessible regions, covered by water for two-thirds of the year. The most favorable time for collecting the product was thought to be the comparatively short season while the ground was dry.

LES PLANTES MÉDICINALES ET TOXIQUES DE LA GUYANE FRANÇAISE. Par le Dr. Édouard Heckel. Macon, 1897.

The French nation is giving more attention than formerly to its colonies and their products: and this volume of ninety-three pages is evidence of an effort to render available the medicinal plants of French Guiana.

The descriptions of the various plants are arranged alphabetically, each having one or more common names, followed by the botanical name, natural order, part employed, its use and method of administration. Among those described are to be found some well-known representatives of our own materia medica, as for example, Phytolacca decandra and Ricinus communis; the former is given as an introduced plant.

No one interested in the science of applied botany can read this contribution without being greatly benefited thereby, and the author, who has published it with the sole object of rendering some service to this branch of science deserves the gratitude of many outside of his own country.

DIGEST OF CRITICISMS ON THE UNITED STATES PHARMACOPŒIA. Seventh decennial revision (1890). Published by the Committee. Part I, pp. 183. New York, 1897.

The Committee has again been fortunate in securing the services of Mr. Hans M. Wilder in compiling this Digest. It is a valuable summary of nearly all the papers on the preparations of the Pharmacopœia to July 1, 1896. The book is not for sale, but copies may be obtained by remitting seven cents in postage stamps to Dr. Charles Rice, Bellevue Hospital, New York.

A RECALCULATION OF THE ATOMIC WEIGHTS. By Frank Wigglesworth Clarke. New edition, revised and enlarged. Published by the Smithsonian Institution, 1897.

The first edition of this work was published in 1882. Since then, new matter has been constantly accumulating, and the result in most cases has been a slight lowering of the figures representing the atomic weights of the elements. Clarke's figures are in nearly every case lower than those of Meyer and Seubert, which was published in the U.S.P. 1890. With hydrogen as 1,000, oxygen is given as 15·88.

CONTRIBUTION II TO THE COASTAL AND PLAIN FLORA OF YUCATAN. By Charles Frederick Millspaugh, M.D. Field Columbian Museum, publication 15. Botanical series, Vol. 1, No. 3. Chicago, December, 1896.

This is a valuable contribution to the botanical knowledge of the almost unknown country of which it treats.

PROCEEDINGS OF THE FIFTEENTH ANNUAL MEETING OF THE VIRGINIA PHARMACEUTICAL ASSOCIATION, held at Hampton, Va., July 21 to 23, 1896.

Several interesting papers add to the value of these proceedings. One paper, by Geo. E. Barksdale, is devoted to a description of a new form of percolator, to which a stirrer is attached.

COMPLETE PRICE LIST AND CATALOGUE OF PARKE, DAVIS & CO. Detroit, Mich., 1897.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, March 17, 1897.

The sixth of the present series of Pharmaceutical Meetings was held in the College Museum at 3.30 P.M. J. W. England presided. The minutes of the last meeting were allowed to stand as published.

The chairman called for the presentation of specimens and the following were exhibited: A sample of the matrix of the diamond, which is a kind of blue clay, from Kimberly Mine, South Africa, presented by Mr. Chas. Bullock; and two photographs, one of two beech trees which had grown together in several places, and the other of a birch tree, which was 17 feet in circumference, 4 feet from the ground. The trees grew in Sullivan County, Pa., and the photographs were presented by Mr. Chas. H. LaWall.

The first paper, which was on the subject of "Parthenium Hysterophorous," by Dr. H. V. Arny, was read by Professor Trimble (see p. 169). The active principle, or principles, of this plant have heretofore generally been regarded as an alkaloid by investigators. However, an examination of the plant, in 1889 by the author, gave no evidences of an alkaloid, but a substance was isolated which was then believed to be a glucoside. It was, therefore, with a view of clearing up the chemistry of the bitter principle of the plant that the present investigation was undertaken.

The second paper presented was on a "Proximate Analysis of Orris Root," by S. Allen Tucker (see p. 199). This analysis was undertaken for the purpose of ascertaining the effects of solvents on orris root, as it was believed that such knowledge would be found of service in determining the percentage of this root in tooth powders and like preparations. An interesting result of the analysis was the large amount of starch which was 16·85 per cent.

A paper entitled "A Brief Résumé of Acetic Anhydride in Oil Analysis, and a Modification of the Method for Estimating Menthol in Oil of Peppermint" was read by Lyman F. Kebler (see p. 189). The author referred to the difficulties which have attended the examination of essential oils, but said that methods are being established which will render their analysis quite easy. Among other factors to be considered, he emphasized the importance of the boiling point.

Replying to an inquiry in reference to the production of the esters of essential oils, Professor Sadtler referred to a recent report of Schimmel and Co. on this subject, and mentioned some of the compound ethers which are being sold in concentrated form by that firm.

"Some Observations on Acacia of Commerce" was the subject of a contribution by J. Henry Schroeder (see p. 195). The chairman remarked upon the great change in the character of acacia, and said that it did not possess the adhesiveness that it formerly had.

Professor Ryan said that twenty years ago no gum but that of Acacia Senegal was sold, while the present supply is obtained from a variety of sources, and as a result much of it is of inferior quality. He advised care in buying the powdered or granulated gum, and said that he had examined a sample of powder which contained 40 per cent. of starch.

Messrs. Boring and Procter also remarked on the unsatisfactory quality of the drug.

The last paper on the programme was read by Harry Matusow, the subject being "Marrubiin and its Chlorine Derivative" (see p. 201). This paper gave evidence of much careful work on the part of its author, and the importance of the study and classification of the active constituents of various plants cannot be overestimated.

At the close of the consideration of the papers, a lamp, which was presented by Messrs. Eli Lilly & Co., of Indianapolis, Ind., and which is known as the Moffatt Formaldehyde Generator, was exhibited. Professor Trimble described the method of using it, and its general construction is illustrated by the accompanying drawing. The device is recommended for disinfecting purposes, its usefulness in this respect being due to the conversion of methyl alcohol into formaldehyde gas. The amount of gas generated from one pint of alcohol is said to effectually disin-

fect a capacity of 3,000 cubic feet. A photograph of a battery of twelve generators was also exhibited. The generators are all connected with one large reservoir for containing the alcohol, and this form of the apparatus may be used for the disinfection of large spaces.

An expression of thanks was voted Messrs. Eli Lilly & Co. for their present, and those who furnished papers.

On motion, the meeting adjourned.

THOS. S. WIEGAND,
Registrar.

NOTES AND NEWS.

Wild Garlic.—Allium vineale is the most injurious weed at the present time in the Middle Atlantic States. From Pennsylvania to South Carolina and Tennessee, it is known to townspeople as disfiguring lawns; to farmers and millers as a pest in wheat, and to dairymen and their customers as ruining dairy products when eaten by cows in the pastures. It is not native in this country, but was introduced at an early date from the Old World. One of the earliest authentic records of its presence in America is contained in Pursh's American Flora, published in 1814, in which it is said to be "in old fields; common."—*Circular No. 9, United States Department of Agriculture, Division of Botany.*

Sandalwood oil should not have a specific gravity less than 0·975 at 15°, and it should dissolve in 5 parts of alcohol of 70 per cent. by volume. The following process for its examination has been devised by A. J. Hendrix (*Jour. de Pharm. et de Chim.* [6] 4, 499): Weigh into a flask of 10 c.c. capacity 2 grammes of a solution of 3 parts crystallized phenol in 1 part of alcohol, add 0·5 gramme of the oil and mix perfectly. Add 0·5 gramme concentrated hydrochloric acid without shaking. At the intersection of the liquids there is formed in pure sandalwood oil a yellow coloration, changing to a bright red in a few minutes. With oil of copaiba the upper quickly becomes mauve-colored. With oil of cedar the upper liquid becomes cloudy, and a brownish color is developed at the intersection.

OBITUARY.

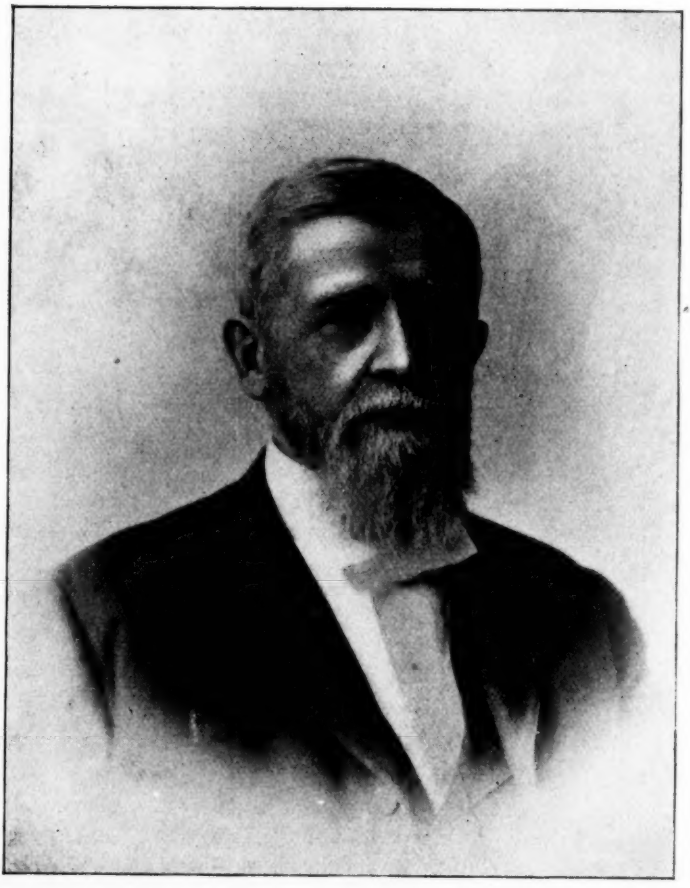
William Kline Mattern, M.D., Ph.G., died suddenly April 16, 1896, at the Coroner's private office, No. 632 Chestnut Street, this city. Death was caused by rupture of the pulmonary artery as a result of blood-poisoning.

Dr. Mattern was in the forty-ninth year of his age, having been born at Hereford, Lehigh County, Pa., August 5, 1847.

He came to this city in 1870, and graduated from the Philadelphia College of Pharmacy in 1874. Since 1886 he had been engaged in the retail drug business at 2602 Germantown Avenue.

After having taken a course at Jefferson Medical College, he received the degree of Doctor of Medicine in 1882. Dr. Mattern was officially connected with the Twenty-eighth Sectional School Board for several years, and, in 1895, was appointed a member of the Board of Education.

In 1892 he received the appointment of Coroner's Physician, which position he had held since that time.



P. S. Shoemaker